Green Township School District Grade 6 Mathematics Curriculum - Revised 2017

Unit 1: Ratios & Unit Rates **(Approximate Instructional Time: 7 weeks)**		
NJ Student Learning Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills** ***(Learning goals are for the Unit but may not necessarily be in sequential order.)***
● 6.RP.A.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*	MP.2 Reason abstractly and quantitatively.	Concept(s): Representing and reasoning about ratios ● *A ratio shows relative sizes or values of two quantities*. Students are able to: ● understand that a ratio is an ordered pair of non-negative numbers, which are not both zero and that the order of the pair of numbers in a ratio matters and that the description of the ratio relationship determines the correct order of the numbers. ● understand that a ratio is often used instead of describing the first number as a multiple of the second. Students use the precise language and notation of ratios (e.g., 3: 2, 3 to 2). ● conceive of real-world contextual situations to match a given ratio. ● create multiple ratios from a context in which more than two quantities are given. ● use tape diagrams to find an equivalent ratio when given the part-to-part ratio and the total of those two quantities and to find an equivalent ratio when given the part-to-part ratio and the difference between those two quantities. ● use tape diagrams to solve problems when the part-to-part ratio is given and the value of one of the quantities is given. ● formalize a definition of equivalent ratios: Two ratios, A: B and C: D, are equivalent ratios if there is a positive number, c, such that $C = cA$ and $D = cB$. ● identify equivalent ratios. ● use tape diagrams and the description of equivalent ratios to determine if two ratios are equivalent, and use tape diagrams to solve problems when given a ratio between two quantities and a change to those quantities that changes the ratio. ● understand the relationship between ratios and fractions. Students describe the fraction A/B associated with the ratio A: B as the value of the ratio A to B. Students understand that when given a ratio A: B, different ratios can be formed

		from the numbers A and B. For example, B: A, A: $(A + B)$, and B: $(A + B)$ are associated with the same ratio relationship. ● understand the value of a ratio A: B is A/B. They understand that if two ratios are equivalent, the ratios have the same value. Students use the value of a ratio to solve ratio problems in a real-world context. Students use the value of a ratio in determining whether two ratios are equivalent. ● describe a ratio relationship between two quantities using ratio language. **Learning Goal 1:** Build conceptual understanding of ratio concepts, use ratio language and describe ratio relationships between two quantities.
● 6.RP.A.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(benchmarked) 6.RP.A.3a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. 6.RP.A.3b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* 6.RP.A.3c. Find a percent of a quantity as a rate per 100 (e.g.,	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning	Concept(s): Unit rates, equivalent ratios and percents. Students are able to: ● use ratio and rate reasoning to create tables of equivalent ratios relating quantities with *whole number* measurements, find missing values in tables and plot pairs of values. ● compare ratios using tables of equivalent ratios. ● solve real world and mathematical problems involving unit rate (including unit price and constant speed). ● calculate a percent of a quantity and solve problems by finding the whole when given the part and the percent. ● convert measurement units using ratio reasoning. ● transform units appropriately when multiplying and dividing quantities. **Learning Goal 2*:*** Create and complete tables of equivalent ratios to solve real world and mathematical problems using ratio and rate reasoning that include making tables of equivalent ratios, solving unit rate problems, finding percent of a quantity as a rate per 100. **Learning Goal 3:** Use ratio and rate reasoning to convert measurement units and to transform units appropriately when multiplying or dividing quantities. **Learning Goal 4:** Use ratio reasoning to solve problems involving percent.

30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. 6.RP.A.3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.		
• 6.RP.A.2. Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*	MP.2 Reason abstractly and quantitatively.	Concept(s): Unit Rates • *A rate is a ratio comparing two different types of quantities.* Students will be able to: • determine the unit rate given a ratio relationship. • describe a unit rate relationship between two quantities using rate language. **Learning Goal 5:** Build conceptual understanding of unit rates and rate notation, use rate language, in the context of the ratio relationship, to describe a unit rate, and solve unit rate problems involving unit pricing and constant speed.
Interdisciplinary Connections: **NGSS Appendix for Alignment**	***Science:*** **MS-PS1 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use signed numbers, write and solve equations, and use order of magnitude thinking and basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science examples: (1) A pile of salt has mass 100 mg. How much chlorine is in it? Answer in milligrams. What would the answer be for a 500 mg pile of salt? (2) Twice as much water is twice as heavy. Explain why twice as much water isn't twice as dense. (3) Based on a model of a water molecule, recognize that any sample of water has a 2:1 ratio of hydrogen atoms to oxygen atoms. (4) Measure the mass and volume of a sample of reactant and compute its density. (5) Compare a measured/computed density to a nominal/textbook value, converting units as necessary. Determine the percent difference between the two.* *The Number System (6–8.NS). Science examples: Use positive and negative quantities to represent temperature changes in a chemical reaction (signs of energy released or absorbed).* *Statistics and Probability (6–8.SP). Science example: Compile all the boiling point measurements from the class into a line plot and discuss the distribution in terms of clustering and outliers. Why weren't all the measured values equal? How close is the average value to the nominal/textbook value? Show the average value and the nominal value on the line plot.* **MS-PS2 As part of this work, teachers should give students opportunities to work with signed numbers and interpret**	

	expressions: *The Number System (6–8.NS). Science examples: (1) Represent a third-law pair of forces as a 100 N force on one object and a −100N force on the other object. (2) Represent balanced forces on a single object as equal and opposite numbers 5 N. (3) Represent the net result of two or more forces as a sum of signed numbers. For example, given a large force and an oppositely directed small force, represent the net force as (100 N) + (−5 N) = 95 N. Relate the number sentence to the fact that the net effect on the motion is approximately what it would have been with only the large force* *Expressions and Equations (6–8.EE). Science example: Interpret an expression in terms of a physical context, e.g., interpret the expression F1 + F2 in a diagram as representing the net force on an object.* **MS-PS3 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships and basic statistics:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for kinetic energy vs. mass (holding speed constant). Decide whether the two quantities are in a proportional relationship, e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.* **MS-PS4 As part of this work, teachers should give students opportunities to use ratios and proportional relationships:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for wave energy vs. wave amplitude. Decide whether the two quantities are in a proportional relationship, (e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). (2) Interpret an idealized set of bivariate measurement data for wave energy vs. wave speed.* **MS-LS1 As part of this work, teachers should give students opportunities to use order of magnitude thinking, write and solve equations & analyze data:** *Expressions and Equations (6–8.EE). Science examples: (1) Quantify the sizes of cells and parts of cells, using convenient units such as microns.(2) Appreciate the orders of magnitude that span the difference in size between cells, molecules, and atoms. (3) Write a number sentence that expresses the conservation of mass as food moves through an organism. Assign values to the arrows in a diagram to show flows quantitatively. (4) Infer an unknown mass by using the concept of conservation to write and solve an equation with a variable.* **MS-LS2 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, write and solve equations, and use basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science example: Use ratios and unit rates as inputs for evaluating plans for maintaining biodiversity and ecosystem services (e.g., consider the net cost or net value of developing a wetland, using inputs such as the value of various wetland services in dollars per acre per year; in analyzing urban biodiversity, rank world cities by the amount of green space as a fraction of total land area; in analyzing social factors, determine the amount of green space per capita (m^2 per person)).* *Expressions and Equations (6–8.EE). Science examples: (1) Write a number sentence that expresses the conservation of total matter or energy in a system as matter or energy flows into, out of, and within it. Assign values to the arrows in a diagram to show flows quantitatively. (2) Infer an unknown matter or energy flow in a system by using the concept of conservation to write and solve an equation with a variable.* **MS-LS4 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use concepts of probability, and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP) Science examples: Apply several ratios in combination to determine a net survival rate. For example, if 50 animals in a population have trait A while 50 have trait B, and each winter the survival rates are 80% for trait A and 60% for trait B, then how many of the animals with each trait will be alive after 1 winters? How about after 2 winters? 6 winters?*

	MS-ESS2 As part of this work, teachers should give students opportunities to work with positive and negative numbers, and use order of magnitude thinking: *The Number System (6–8.NS). Science examples: (1) Use positive and negative quantities to quantify changes in physical quantities such as atmospheric pressure and temperature; for example, if the temperature dropped from 24oC to 11oC, then the temperature change was −13oC. (2) Solve word problems relating to changes in signed physical quantities. For example, a shift in the jet stream caused a 10oC temperature increase in a single day; if the temperature before was −32oC, what was the temperature after?* **MS-ESS3 As part of this work, teachers should give students opportunities to use ratios and proportional relationships and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP). Science example: Work with measurement quantities that are formed through division, such as atmospheric concentration of CO_2, extraction cost per barrel of oil in different forms, per-capita consumption of given resources, flow rates in freshwater rivers, etc.* ***English-Language Arts:*** ***RI.6.4**. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.* ***W.6.2.** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.* *A. Introduce a topic and organize ideas, concepts, and information, using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.* *B. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.* *C. Use appropriate transitions to clarify the relationships among ideas and concepts.* *D. Use precise language and domain-specific vocabulary to inform about or explain the topic.* *E. Establish and maintain a formal/academic style, approach, and form.* *F. Provide a concluding statement or section that follows from the information or explanation presented.* ***W.6.4.** Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.6.7.** Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.* ***W.6.8**. Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.* ***SL.6.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.* *A. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.* *B. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.* *C. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.* *D. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.* ***SL.6.2.** Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.*

	SL.6.3. *Deconstruct a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.* ***SL.6.4****. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).* ***SL.6.5.*** *Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.* ***SL.6.6****. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**
2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:

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District/School Primary and Supplementary Resources	
Primary Resource: **Eureka Math (Unbound Ed - Module 1)**	**Supplementary Resources:** Number Talks: Building Numerical Reasoning Sadlier Progress In Mathematics Online Resources - Grade 6 ***Sadlier Progress in Mathematics*** Workbooks ***Pre-Algebra*** (Publisher: Larsen) ***Study Island*** ***Excel Math*** (Publisher: AnsMar) ***Khan Academy*** ***Learnzillion*** ***IXL*** Visual Patterns: Gr. K-12 Number Strings Common Core Progression Documents **Performance Tasks are available for use from the following sites:** Illustrative Mathematics Coherence Map Inside Mathematics Problems of the Month Grade 6 YouCubed Tasks
Suggested Tools & Representations:	**Suggested Tasks for Use During Unit**
❑ *Tape Diagrams* ❑ *Double Number Line Diagrams* ❑ *Ratio Tables* ❑ *Coordinate Plane*	6.RP.A.1 Games at Recess 6.RP.A.2 Price per pound and pounds per dollar 6.RP.A.3 Voting for Three, Variation 1 6.RP.A.3c Shirt Sale 2015 EOY Released Items 6.RP.A.1, 6.RP.A.2, 6.RP.A.3 - *#1, #27, #28, #32-34* 2015 EOY Released Items PBA Released Items 6.RP.A.1, 6.RP.A.2, 6.RP.A.3 - *#1, #9* PBA Released Items 6.RP.A.3 - #9 2015 PBA Released Items

District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Sprints • Self-assessment by students with guidance from teacher. • Exit tickets • Khan Academy teacher reports • Star and Accelerated Math programs	• Teacher created assessments and projects • ***Sadlier*** Unit Assessments • ***Eureka Math*** Mid- and End- Module Assessments (Constructed response item with rubric) • Teacher/District created benchmark assessments
Instructional Best Practices and Exemplars	**Mathematical Terms/Vocabulary**
❑ *Math Work Stations* ❑ *Use Communicators/manipulatives* ❑ *Number talks* ❑ *Hands-on activities* ❑ *Exploratory activities* ❑ *Games/play* ❑ *Using concrete materials to advance conceptual understanding* ❑ *Use drawings and diagrams to advance conceptual understanding* ❑ *Connect current concepts to previously learned skills* ❑ *Small group instruction* ❑ *Whole class discussion* ❑ *Research* ❑ *Use of open educational resources for instruction or practice*	• **Ratio** (A pair of nonnegative numbers, A:B, where both are not zero, and that are used to indicate that there is a relationship between two quantities such that when there are A units of one quantity, there are B units of the second quantity.) • **Rate** (A rate indicates, for a proportional relationship between two quantities, how many units of one quantity there are for every 1 unit of the second quantity. For a ratio of A: B between two quantities, the rate is A/B units of the first quantity per unit of the second quantity.) • **Unit Rate** (The numeric value of the rate, e.g., in the rate 2.5 mph, the unit rate is 2.5.) • **Value of a Ratio** (For the ratio A: B, the value of the ratio is the quotient A/B.) • **Equivalent Ratios** (Ratios that have the same value.) • **Percent** (Percent of a quantity is a rate per 100.) • **Associated Ratios** (e.g., if a popular shade of purple is made by mixing 2 cups of blue paint for every 3 cups of red paint, not only can we say that the ratio of blue paint to red paint in the mixture is 2: 3, but we can discuss associated ratios such as the ratio of cups of red paint to cups of blue paint, the ratio of cups of blue paint to total cups of purple paint, the ratio of cups of red paint to total cups of purple paint, etc.) • **Double Number Line** (See example under Suggested Tools and Representations.) • **Ratio Table** (A table listing pairs of numbers that form equivalent ratios; see example under Suggested Tools and Representations.)
Focus Mathematical Concepts	

Grade Level Fluency Requirement:

- **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm.
- **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Prerequisite skills

Refer to Achieve the Core Coherence Map for full detail on vertical and horizontal alignment to prerequisite skills & future skills.

Coherence Map

Use the four operations with whole numbers to solve problems.

4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.B.3 Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?

Convert like measurement units within a given measurement system.

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Common Misconceptions:

- Students may believe that dividing by ½ is the same as dividing in half. Dividing by half means to find how many ½ 's there are in a quantity, whereas, dividing in half means to take a quantity and split it into two equal parts. Thus 7 divided by ½ = 14 and 7 divided in half equals 3 ½ .
- -Fractions and ratios may represent different comparisons. Fractions always express a part-to-whole comparison, but ratios can express a part-to-whole comparison or a part-to-part comparison which can be written as: a to b, a/b, or a:b

- Even though ratios and fractions express a part-to-whole comparison, the addition of ratios and the addition of fractions are distinctly different procedures. When adding ratios, the parts are added, the wholes are added and then the total part is compared to the total whole. For example, (2 out of 3 parts) + (4 out of 5 parts) is equal to six parts out of 8 total parts (6 out of 8) if the parts are equal. When dealing with fractions, the procedure for addition is based on a common denominator: (⅔) + (⅘) = (10/15) + (12/15) which is equal to (22/15). Therefore, the addition process for ratios and for fractions is distinctly different.
- Often there is a misunderstanding that a percent is always a natural number less than or equal to 100. Provide examples of percent amounts that are greater than 100%, and percent amounts that are less 1%.

Differentiation/Accommodations/Modifications

Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work
- Visual dictionaries to help build vocabulary
- Provide copy of classnotes

- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.

- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments
- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom
- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments
- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

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Unit 2:Arithmetic Operations Including Division of Fractions **(Approximate Instructional Time: 5 weeks)**		
NJ Student Learning Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills** ***(Learning goals are for the Unit but may not necessarily be in sequential order.)***
● 6.NS.A.1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	MP.4 Model with mathematics.	Concept(s): Dividing fractions by fractions Students are able to: ● divide a fraction by a fraction. ● represent division of fractions using visual models. ● interpret quotients of fractions in the context of the problem. ● compute quotients of fractions in order to solve word problems. ● write equations to solve word problems involving division of fraction by a fraction. ● use the relationship between multiplication and division to explain division of fractions. **Learning Goal 1:** Compute quotients of fractions. **Learning Goal 2:** Construct visual fraction models to represent quotients of fractions and use the relationship between multiplication and division to explain division of fractions. **Learning Goal 3:** Solve real-world problems involving quotients of fractions and interpret the solutions in the context given.
● 6.NS.B.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): Dividing whole numbers and decimals Students are able to: ● relate decimals to mixed numbers and round addends, minuends, and subtrahends to whole numbers in order to predict reasonable answers. ● use their knowledge of adding and subtracting multi-digit numbers to find the

	MP.8 Look for and express regularity in repeated reasoning.	sums and differences of decimals. ● understand the importance of place value and solve problems in real-world contexts ● Through the use of arrays and partial products, students use place value and apply the distributive property to find the product of decimals. ● use estimation and place value to determine the placement of the decimal point in products and to determine that the size of the product is relative to each factor. ● discover and use connections between fraction multiplication and decimal multiplication. ● recognize that the sum of the number of decimal digits in the factors yields the decimal digits in the product. ● use the standard algorithm to divide multi-digit numbers with speed and accuracy. **Learning Goal 4:** Fluently add, subtract, multiply and divide multi-digit decimals.
● 6.NS.B.2. Fluently divide multi-digit numbers using the standard algorithm.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): Dividing whole numbers and decimals Students are able to: ● connect estimation with place value in order to determine the standard algorithm for division. ● understand that the standard algorithm of division is simply a tally system arranged in place value columns. ● use the algorithm to divide multi-digit numbers with and without remainders. ● compare their answer to estimates to justify reasonable quotients. ● understand that when they "bring down" the next digit in the algorithm, they are distributing, recording, and shifting to the next place value. ● use their knowledge of dividing multi-digit numbers to solve for quotients of multi-digit decimals. ● understand the mathematical concept of decimal placement in the divisor and the dividend and its connection to multiplying by powers of 10 **Learning Goal 5**: Fluently divide multi-digit numbers using the standard algorithms.

• 6.NS.B.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.	MP.7 Look for and make use of structure.	Concept(s): Number theory - thinking logically about multiplicative arithmetic Students are able to: • generalize rules for adding and multiplying even and odd numbers. • apply divisibility rules, specifically for 3 and 9, to understand factors and multiples. • find the least common multiple and greatest common factor and apply knowledge of factors to use the distributive property. • explore and discover that Euclid's Algorithm is a more efficient means to finding the greatest common factor of larger numbers and determine that Euclid's Algorithm is based on long division. **Learning Goal 6:** Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two numbers less than or equal to 12, and use these tools to solve problems.
• **Interdisciplinary Connections:** • • **NGSS Appendix for Alignment**	***Science:*** **MS-PS1 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use signed numbers, write and solve equations, and use order of magnitude thinking and basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science examples: (1) A pile of salt has mass 100 mg. How much chlorine is in it? Answer in milligrams. What would the answer be for a 500 mg pile of salt? (2) Twice as much water is twice as heavy. Explain why twice as much water isn't twice as dense. (3) Based on a model of a water molecule, recognize that any sample of water has a 2:1 ratio of hydrogen atoms to oxygen atoms. (4) Measure the mass and volume of a sample of reactant and compute its density. (5) Compare a measured/computed density to a nominal/textbook value, converting units as necessary. Determine the percent difference between the two.* *The Number System (6–8.NS). Science examples: Use positive and negative quantities to represent temperature changes in a chemical reaction (signs of energy released or absorbed).* *Statistics and Probability (6–8.SP). Science example: Compile all the boiling point measurements from the class into a line plot and discuss the distribution in terms of clustering and outliers. Why weren't all the measured values equal? How close is the average value to the nominal/textbook value? Show the average value and the nominal value on the line plot.* **MS-PS2 As part of this work, teachers should give students opportunities to work with signed numbers and interpret expressions:** *The Number System (6–8.NS). Science examples: (1) Represent a third-law pair of forces as a 100 N force on one object and a −100N force on the other object. (2) Represent balanced forces on a single object as equal and opposite numbers 5 N. (3) Represent the net result of two or more forces as a sum of signed numbers. For example, given a large force and an oppositely directed small force, represent the net force as (100 N) + (−5 N) = 95 N. Relate the number sentence to the fact that the net effect on the motion is approximately what it would have been with only the large force* *Expressions and Equations (6–8.EE). Science example: Interpret an expression in terms of a physical context, e.g., interpret the*	

	expression F1 + F2 in a diagram as representing the net force on an object. **MS-PS3 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships and basic statistics:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for kinetic energy vs. mass (holding speed constant). Decide whether the two quantities are in a proportional relationship, e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.* **MS-PS4 As part of this work, teachers should give students opportunities to use ratios and proportional relationships:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for wave energy vs. wave amplitude. Decide whether the two quantities are in a proportional relationship, (e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). (2) Interpret an idealized set of bivariate measurement data for wave energy vs. wave speed.* **MS-LS1 As part of this work, teachers should give students opportunities to use order of magnitude thinking, write and solve equations & analyze data:** *Expressions and Equations (6–8.EE). Science examples: (1) Quantify the sizes of cells and parts of cells, using convenient units such as microns.(2) Appreciate the orders of magnitude that span the difference in size between cells, molecules, and atoms. (3) Write a number sentence that expresses the conservation of mass as food moves through an organism. Assign values to the arrows in a diagram to show flows quantitatively. (4) Infer an unknown mass by using the concept of conservation to write and solve an equation with a variable.* **MS-LS2 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, write and solve equations, and use basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science example: Use ratios and unit rates as inputs for evaluating plans for maintaining biodiversity and ecosystem services (e.g., consider the net cost or net value of developing a wetland, using inputs such as the value of various wetland services in dollars per acre per year; in analyzing urban biodiversity, rank world cities by the amount of green space as a fraction of total land area; in analyzing social factors, determine the amount of green space per capita (m^2 per person)).* *Expressions and Equations (6–8.EE). Science examples: (1) Write a number sentence that expresses the conservation of total matter or energy in a system as matter or energy flows into, out of, and within it. Assign values to the arrows in a diagram to show flows quantitatively. (2) Infer an unknown matter or energy flow in a system by using the concept of conservation to write and solve an equation with a variable.* **MS-LS4 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use concepts of probability, and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP) Science examples: Apply several ratios in combination to determine a net survival rate. For example, if 50 animals in a population have trait A while 50 have trait B, and each winter the survival rates are 80% for trait A and 60% for trait B, then how many of the animals with each trait will be alive after 1 winters? How about after 2 winters? 6 winters?* **MS-ESS2 As part of this work, teachers should give students opportunities to work with positive and negative numbers, and use order of magnitude thinking:** *The Number System (6–8.NS). Science examples: (1) Use positive and negative quantities to quantify changes in physical quantities such as atmospheric pressure and temperature; for example, if the temperature dropped from 24oC to 11oC, then the temperature change was −13oC. (2) Solve word problems relating to changes in signed physical quantities. For example, a shift in the jet stream caused a 10oC temperature increase in a single day; if the temperature before was −32oC, what was the temperature after?*

	MS-ESS3 As part of this work, teachers should give students opportunities to use ratios and proportional relationships and use order of magnitude thinking: *Ratios and Proportional Relationships (6–7.RP). Science example: Work with measurement quantities that are formed through division, such as atmospheric concentration of CO_2, extraction cost per barrel of oil in different forms, per-capita consumption of given resources, flow rates in freshwater rivers, etc.* ***English-Language Arts:*** ***RI.6.4**. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.* ***W.6.2.** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.* *A. Introduce a topic and organize ideas, concepts, and information, using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.* *B. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.* *C. Use appropriate transitions to clarify the relationships among ideas and concepts.* *D. Use precise language and domain-specific vocabulary to inform about or explain the topic.* *E. Establish and maintain a formal/academic style, approach, and form.* *F. Provide a concluding statement or section that follows from the information or explanation presented.* ***W.6.4.** Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.6.7.** Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.* ***W.6.8**. Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.* ***SL.6.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.* *A. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.* *B. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.* *C. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.* *D. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.* ***SL.6.2.** Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.* ***SL.6.3.** Deconstruct a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.* ***SL.6.4**. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).* ***SL.6.5.** Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.*

	***SL.6.6**. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**
2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:

District/School Primary and Supplementary Resources	
Primary Resource: **Eureka Math (Unbound Ed - Module 2)**	**Supplementary Resources:** Number Talks: Building Numerical Reasoning Sadlier Progress In Mathematics Online Resources - Grade 6 ***Sadlier Progress in Mathematics*** Workbook ***Study Island*** ***Excel Math*** (Publisher: AnsMar) ***Khan Academy*** ***IXL*** Visual Patterns: Gr. K-12

	Number Strings Common Core Progression Documents **Performance Tasks are available for use from the following sites:** Illustrative Mathematics Coherence Map Inside Mathematics Problems of the Month Grade 6 YouCubed Tasks
Suggested Tools & Representations: ❑ *Counters* ❑ *Fraction Tiles* ❑ *Tape Diagrams* ❑ *Area Models*	**Suggested Tasks for Use During Unit** 6.NS.A.1 Traffic Jam 6.NS.B.3 Reasoning about Multiplication and Division and Place Value, Part 1 6.NS.B.4 Factors and Common Factors 6.NS.B.4 Multiples and Common Multiples 2015 EOY Released Items 6.NS.A.1 and 6.NS.B2. - *#12, #13, #14* 2015 EOY Released Items 6.NS.B.3 and 6.NS.B4 - *#5, #18-21* 2015 EOY Released Items 2015 PBA Released Items 6.NS.1-2 - *#3* 2015 PBA Released Items 6.NS.2 Rabbit Costumes Task
District/School Formative Assessment Plan ● Teacher observation of students engaged in group and independent activities. ● Individual and small group conferences/interviews to assess understanding with rubric ● Sprints ● Self-assessment by students with guidance from teacher. ● Exit tickets ● Khan Academy teacher reports ● Star and Accelerated Math programs	**District/School Summative Assessment Plan** ● Teacher created assessments and projects ● ***Sadlier*** Unit Assessments ● ***Eureka Math*** Mid- and End- Module Assessments (Constructed response item with rubric) ● Teacher/District created benchmark assessments

Instructional Best Practices and Exemplars	**Mathematical Terms/Vocabulary**
❑ *Math Work Stations* ❑ *Use Communicators/manipulatives* ❑ *Number talks* ❑ *Hands-on activities* ❑ *Exploratory activities* ❑ *Games/play* ❑ *Using concrete materials to advance conceptual understanding* ❑ *Use drawings and diagrams to advance conceptual understanding* ❑ *Connect current concepts to previously learned skills* ❑ *Small group instruction* ❑ *Whole class discussion* ❑ *Research* ❑ *Use of open educational resources for instruction or practice*	• **Greatest Common Factor** (The largest positive integer that divides into two or more integers without a remainder; the GCF of 24 and 36 is 12 because when all of the factors of 24 and 36 are listed, the largest factor they share is 12.) • **Least Common Multiple** (The smallest positive integer that is divisible by two or more given integers without a remainder; the LCM of 4 and 6 is 12 because when the multiples of 4 and 6 are listed, the smallest or first multiple they share is 12.) • **Multiplicative Inverses** (Two numbers whose product is 1 are multiplicative inverses of one another. For example, 3/4 and 4/3 are multiplicative inverses of one another because $3/4 \times 4/3 = 4/3 \times 3/4 = 1$. Multiplicative inverses do not always have to be the reciprocal. For example 1/5 and 10/2 both have a product of 1, which makes them multiplicative inverses.)

Focus Mathematical Concepts

Grade Level Fluency Requirement:

- ❖ **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm.
- ❖ **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Prerequisite skills

Refer to Achieve the Core Coherence Map for full detail on vertical and horizontal alignment to prerequisite skills & future skills.

Coherence Map

Gain familiarity with factors and multiples.

4.OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Understand the place value system.

5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.B.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show* $(2/3) \times 4 = 8/3$, *and create a story context for this equation. Do the same with* $(2/3) \times (4/5) = 8/15$. *(In general,* $(a/b) \times (c/d) = ac/bd$.*)*
5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by fractions.[1]
a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for* $(1/3) \div 4$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $(1/3) \div 4 = 1/12$ *because* $(1/12) \times 4 = 1/3$.
b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for* $4 \div (1/5)$, *and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that* $4 \div (1/5) = 20$ *because* $20 \times (1/5) = 4$.

Common Misconceptions:

- Students misinterpret a fraction as a division problem. Example: ¼ is not 1.4 but 0.25.

Differentiation/Accommodations/Modifications

Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work
- Visual dictionaries to help build vocabulary
- Provide copy of classnotes
- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.

- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time

- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Green Township School District Grade 6 Mathematics Curriculum - Revised 2017

Unit 3: Rational Numbers **(Approximate Instructional Time: 5 weeks)**		
NJ Student Learning Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills** ***(Learning goals are for the Unit but may not necessarily be in sequential order.)***
● 6.NS.C.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically	Concept(s): Positive and negative numbers, used together, describe quantities having opposite directions or opposite values. Students are able to: ● represent quantities with positive and negative numbers in real-world contexts. ● interpret positive and negative numbers in real-world contexts. ● explain the meaning of zero, in context, in each real-world situation. **Learning Goal 1:** Use positive and negative numbers to represent quantities in real-world situations, explaining the meaning of zero in the context of the real-world situation.
● 6.NS.C.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. 6.NS.C.6a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. 6.NS.C.6b. Understand signs of numbers in ordered pairs as	MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): Foundations of Absolute Value ● *Opposite signs of numbers indicate locations on opposite sides of 0 on the number line.* ● *The opposite of the opposite of a number is the number itself (e.g. the opposite of three is -3. The opposite of the opposite of three, -(-3), is equal to the original number, 3).* ● *Signs of numbers in ordered pairs indicate their locations in quadrants of the coordinate plane.* ● *When two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.* Students are able to: ● position rational numbers on horizontal and vertical number lines. ● position pairs of rational numbers on a coordinate plane. ● explain the conditions for which pairs of points are reflections across an axes in

indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. 6.NS.C.6c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.		the coordinate plane. ● locate numbers and their opposites on the number line and explain their relation to 0. ● compare and interpret rational numbers' order on the number line, making statements that relate the numbers' location on the number line to their order. ● apply their prerequisite knowledge of place value, decimals, and fractions to compare integers and other rational numbers. ● relate integers and other rational numbers to real-world situations and problems. **Learning Goal 2:** Locate rational numbers and their opposites on horizontal and vertical number lines and explain their relation of the opposites to zero. **Learning Goal 3**: Plot pairs of positive and negative rational numbers in the coordinate plane; describe two ordered pairs that differ only by signs as reflections across one or both axes.
● 6.NS.C.7. Understand ordering and absolute value of rational numbers. 6.NS.C.7a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* 6.NS.C.7b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.* 6.NS.C.7c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically	Concept(s): Absolute Value and Inequalities ● *The absolute value of a rational number is its distance from 0 on the number line.* Students are able to: ● write, interpret, and explain statements of order for rational numbers in the real world. ● understand the absolute value of a number as its distance from zero on the number line. ● use absolute value to find the magnitude of a positive or negative quantity in a real-world situation. ● recognize that if $a < b$, then $-a > -b$ because a number and its opposite are equal distances from zero, and moving along the horizontal number line to the right means the numbers are increasing ● given an inequality, determine the position of one rational number relative to another. ● write and explain inequality statements involving rational numbers. ● justify inequality statements involving rational numbers.

or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* 6.NS.C.7d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*		**Learning Goal 4:** Use statements of inequality to determine relative positions of two rational numbers on a number line; write and explain statements of order for rational numbers in real-world contexts. **Learning Goal 5*:*** Explain the meaning of absolute value of a rational number as distance from zero on the number line and as magnitude for a positive or negative quantity in a real-world situation.
• 6.NS.C.8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): Rational numbers and the coordinate plane Students are able to: • graph points in all four quadrants of the coordinate plane in order to solve real-world and mathematical problems. • draw polygons in the coordinate plane. • use absolute value to find distances between points with the same first coordinate or the same second coordinate. • use coordinates to solve real-world distance, perimeter, and area problems. • make reasonable choices for scales on both axes and locate and label the points on graph paper. **Learning Goal 6:** Solve real world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Use the absolute value of the differences of their coordinates to find distances between points with the same first coordinate or same second coordinate.
Interdisciplinary Connections: **NGSS Appendix for Alignment**	***Science:*** **MS-PS1 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use signed numbers, write and solve equations, and use order of magnitude thinking and basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science examples: (1) A pile of salt has mass 100 mg. How much chlorine is in it? Answer in milligrams. What would the answer be for a 500 mg pile of salt? (2) Twice as much water is twice as heavy. Explain why twice as much water isn't twice as dense. (3) Based on a model of a water molecule, recognize that any sample of water has a 2:1 ratio of hydrogen atoms to oxygen atoms. (4) Measure the mass and volume of a sample of reactant and compute its density. (5) Compare a*	

	measured/computed density to a nominal/textbook value, converting units as necessary. Determine the percent difference between the two. *The Number System (6–8.NS). Science examples: Use positive and negative quantities to represent temperature changes in a chemical reaction (signs of energy released or absorbed).* *Statistics and Probability (6–8.SP). Science example: Compile all the boiling point measurements from the class into a line plot and discuss the distribution in terms of clustering and outliers. Why weren't all the measured values equal? How close is the average value to the nominal/textbook value? Show the average value and the nominal value on the line plot.* **MS-PS2 As part of this work, teachers should give students opportunities to work with signed numbers and interpret expressions:** *The Number System (6–8.NS). Science examples: (1) Represent a third-law pair of forces as a 100 N force on one object and a −100N force on the other object. (2) Represent balanced forces on a single object as equal and opposite numbers 5 N. (3) Represent the net result of two or more forces as a sum of signed numbers. For example, given a large force and an oppositely directed small force, represent the net force as (100 N) + (−5 N) = 95 N. Relate the number sentence to the fact that the net effect on the motion is approximately what it would have been with only the large force* *Expressions and Equations (6–8.EE). Science example: Interpret an expression in terms of a physical context, e.g., interpret the expression F1 + F2 in a diagram as representing the net force on an object.* **MS-PS3 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships and basic statistics:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for kinetic energy vs. mass (holding speed constant). Decide whether the two quantities are in a proportional relationship, e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.* **MS-PS4 As part of this work, teachers should give students opportunities to use ratios and proportional relationships:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for wave energy vs. wave amplitude. Decide whether the two quantities are in a proportional relationship, (e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). (2) Interpret an idealized set of bivariate measurement data for wave energy vs. wave speed.* **MS-LS1 As part of this work, teachers should give students opportunities to use order of magnitude thinking, write and solve equations & analyze data:** *Expressions and Equations (6–8.EE). Science examples: (1) Quantify the sizes of cells and parts of cells, using convenient units such as microns.(2) Appreciate the orders of magnitude that span the difference in size between cells, molecules, and atoms. (3) Write a number sentence that expresses the conservation of mass as food moves through an organism. Assign values to the arrows in a diagram to show flows quantitatively. (4) Infer an unknown mass by using the concept of conservation to write and solve an equation with a variable.* **MS-LS2 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, write and solve equations, and use basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science example: Use ratios and unit rates as inputs for evaluating plans for maintaining biodiversity and ecosystem services (e.g., consider the net cost or net value of developing a wetland, using inputs such as the value of various wetland services in dollars per acre per year; in analyzing urban biodiversity, rank world cities by the amount of green space as a fraction of total land area; in analyzing social factors, determine the amount of green space per capita (m^2 per person)).* *Expressions and Equations (6–8.EE). Science examples: (1) Write a number sentence that expresses the conservation of total matter or*

	energy in a system as matter or energy flows into, out of, and within it. Assign values to the arrows in a diagram to show flows quantitatively. (2) Infer an unknown matter or energy flow in a system by using the concept of conservation to write and solve an equation with a variable. **MS-LS4 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use concepts of probability, and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP) Science examples: Apply several ratios in combination to determine a net survival rate. For example, if 50 animals in a population have trait A while 50 have trait B, and each winter the survival rates are 80% for trait A and 60% for trait B, then how many of the animals with each trait will be alive after 1 winters? How about after 2 winters? 6 winters?* **MS-ESS2 As part of this work, teachers should give students opportunities to work with positive and negative numbers, and use order of magnitude thinking:** *The Number System (6–8.NS). Science examples: (1) Use positive and negative quantities to quantify changes in physical quantities such as atmospheric pressure and temperature; for example, if the temperature dropped from 24oC to 11oC, then the temperature change was −13oC. (2) Solve word problems relating to changes in signed physical quantities. For example, a shift in the jet stream caused a 10oC temperature increase in a single day; if the temperature before was −32oC, what was the temperature after?* **MS-ESS3 As part of this work, teachers should give students opportunities to use ratios and proportional relationships and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP). Science example: Work with measurement quantities that are formed through division, such as atmospheric concentration of CO_2, extraction cost per barrel of oil in different forms, per-capita consumption of given resources, flow rates in freshwater rivers, etc.* ***English-Language Arts:*** ***RI.6.4****. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.* ***W.6.2.*** *Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.* *A. Introduce a topic and organize ideas, concepts, and information, using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.* *B. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.* *C. Use appropriate transitions to clarify the relationships among ideas and concepts.* *D. Use precise language and domain-specific vocabulary to inform about or explain the topic.* *E. Establish and maintain a formal/academic style, approach, and form.* *F. Provide a concluding statement or section that follows from the information or explanation presented.* ***W.6.4.*** *Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.6.7.*** *Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.* ***W.6.8****. Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.* ***SL.6.1.*** *Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.*

	A. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. *B. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.* *C. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.* *D. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.* ***SL.6.2.** Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.* ***SL.6.3.** Deconstruct a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.* ***SL.6.4**. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).* ***SL.6.5.** Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.* ***SL.6.6**. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**
2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:

District/School Primary and Supplementary Resources	
Primary Resource: **Eureka Math (Unbound Ed - Module 3)**	**Supplementary Resources:** Number Talks: Building Numerical Reasoning Sadlier Progress In Mathematics Online Resources - Grade 6 ***Sadlier Progress in Mathematics*** Workbook ***Study Island*** ***Excel Math*** (Publisher: AnsMar) ***Khan Academy*** ***IXL*** Visual Patterns: Gr. K-12 Number Strings Common Core Progression Documents **Performance Tasks are available for use from the following sites:** Illustrative Mathematics Coherence Map Inside Mathematics Problems of the Month Grade 6 YouCubed Tasks
Suggested Tools & Representations:	**Suggested Tasks for Use During Unit**
❑ *Horizontal and Vertical Number Lines* ❑ *Coordinate Plane*	6.NS.C.5 Warmer in Miami 6.NS.C.6 Mile High 6.NS.C.7 Jumping Flea 6.NS.C.7a Fractions on the Number Line 6.NS.C.7b Comparing Temperatures 6.NS.C.8 Nome, Alaska 2015 EOY Released Items 6.NS.C.5, 6.NS.C.6, 6.NS.C.7 #2, #3, #15 2015 PBA Released Items 6.NS.C.6 #4

	https://prc.parcconline.org/system/files/6th%20grade%20Math%20-%20EOY%20-%20Item%20Set_Mar.2016.pdf 2015 EOY Released Items 6.NS.C.5, 6.NS.C.6, 6.NS.C.7 #2, #3, #15 https://prc.parcconline.org/system/files/6th%20grade%20Math%20-%20EOY%20-%20Item%20Set_Mar.2016.pdf
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Sprints • Self-assessment by students with guidance from teacher. • Exit tickets • Khan Academy teacher reports • Star and Accelerated Math programs	• Teacher created assessments and projects • ***Sadlier*** Unit Assessments • ***Eureka Math*** Mid- and End- Module Assessments (Constructed response item with rubric) • Teacher/District created benchmark assessments
Instructional Best Practices and Exemplars	**Mathematical Terms/Vocabulary**
❑ *Math Work Stations* ❑ *Use Communicators/manipulatives* ❑ *Number talks* ❑ *Hands-on activities* ❑ *Exploratory activities* ❑ *Games/play* ❑ *Using concrete materials to advance conceptual understanding* ❑ *Use drawings and diagrams to advance conceptual understanding* ❑ *Connect current concepts to previously learned skills* ❑ *Small group instruction* ❑ *Whole class discussion* ❑ *Research*	• **Absolute Value** (The absolute value of a number is the distance between the number and zero on the number line. For example, $\|3\| = 3$, $\| -4\| = 4$, etc.) • **Charge** (A charge is the amount of money a person must pay, as in a charge to an account, or a fee charged.) • **Credit** (A credit is a decrease in an expense, as in money credited to an account. For instance, when a deposit is made into a checking account, the money is credited to the account. A credit is the opposite of a debit.) • **Debit** (A debit is an increase in an expense or money paid out of an account. For instance, using a debit card to make a purchase will result in an expense, and money will be deducted from the related bank account.) • **Deposit** (A deposit is the act of putting money into a bank account.) • **Elevation** (Elevation is the height of a person, place, or thing above a certain reference level.) • **Integers** (The numbers ... ,−3, −2, −1, 0, 1, 2, 3, … are integers on the number

❑ *Use of open educational resources for instruction or practice*	line.) ● **Magnitude** (The magnitude is the absolute value of a measurement, given the measurement of a positive or negative quantity.) ● **Negative Number** (A negative number is a number less than zero.) ● **Opposite** (In a position on the other side; for example, negative numbers are the opposite direction from zero as positive numbers.) ● **Positive Number** (A positive number is a number greater than zero.) ● **Quadrants** (The four sections of the coordinate plane formed by the intersection of the axes are called quadrants.) ● **Rational Number** (A rational number is a fraction or the opposite of a fraction on the number line.) ● **Withdraw** (To withdraw is to take away; for example, to take money out of a bank account.) ● **Withdrawal** (A withdrawal is the act of taking money out of a bank account.)

Focus Mathematical Concepts

Grade Level Fluency Requirement:

- ❖ **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm.
- ❖ **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Prerequisite skills

Refer to Achieve the Core Coherence Map for full detail on vertical and horizontal alignment to prerequisite skills & future skills.

Coherence Map

Develop understanding of fractions as numbers.

3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.

b. Represent a fraction *a*/*b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each

line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).
5.G.A.2 Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Common Misconceptions:

- Students may misunderstand what the graph represents in context. For example, that moving up or down on a graph does not necessarily mean that a person is moving up or down.
- There cannot be negative lengths for a polygon.

Differentiation/Accommodations/Modifications

Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.

- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work
- Visual dictionaries to help build vocabulary
- Provide copy of classnotes
- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Green Township School District Grade 6 Mathematics Curriculum - Revised 2017

Unit 4: Expressions and Equations **(Approximate Instructional Time: 9 weeks)**		
NJ Student Learning Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills** ***(Learning goals are for the Unit but may not necessarily be in sequential order.)***
● 6.EE.A.1. Write and evaluate numerical expressions involving whole-number exponents	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): Expressions and exponents Students are able to: ● discover that $3x = x + x + x$ is not the same thing as x^3, which is $x \cdot x \cdot x$. ● understand that a base number can be represented with a positive whole number, positive fraction, or positive decimal and that for any number a, we define am to be the product of m factors of a. The number a is the base, and m is called the exponent or power of a. ● write numerical expressions (involving whole number exponents) from verbal descriptions. ● evaluate numerical expressions involving whole number exponents. **Learning Goal 1:** Write and evaluate numerical expressions involving whole number exponents.
● 6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers 6.EE.A.2a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 - y.* 6.EE.A.2b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): Expressing operations in algebraic form Students are able to: ● evaluate numerical expressions. They recognize that in the absence of parentheses, exponents are evaluated first. ● understand that a letter represents one number in an expression. When that number replaces the letter, the expression can be evaluated to one number. ● write expressions that record addition and subtraction operations with numbers. ● write algebraic expressions from verbal descriptions. ● use mathematical terms (sum, term, product, factor, quotient, coefficient) to identify the parts of an expression. ● evaluate algebraic expressions and formulas, including those involving

more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms* 6.EE.A.2c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length s = ½*		exponents. **Learning Goal 2:** Use mathematical language to identify parts of an expression. **Learning Goal 3:** Write and evaluate algebraic expressions involving exponents (include evaluating formulas).
● 6.EE.A.3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y* ● 6.EE.A.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): Relationships of operations & Expanding, factoring and distributing expressions Students are able to: ● build and clarify the relationship of addition and subtraction by evaluating identities such as $w - x + x = w$ and $w + x - x = w$. ● build and clarify the relationship of multiplication and division by evaluating identities such as $a \div b \cdot b = a$ and $a \cdot b \div b =$ a ● build and clarify the relationship of multiplication and addition by evaluating identities such as $3 \cdot g = g + g + g$. ● build and clarify the relationship of division and subtraction by determining that $12 \div x = 4$ means $12 - x - x - x - x = 0$. ● understand that a letter in an expression or an equation can represent a number. When that number is replaced with a letter, an expression or an equation is stated. ● discover the commutative properties of addition and multiplication, the

substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for*		additive identity property of zero, and the multiplicative identity property of one. They determine that $g \div 1 = g$, $g \div g = 1$, and $1 \div g = 1/g$. ● combine like terms to generate an equivalent expression. ● model and write equivalent expressions using the distributive property. They move from expanded form to factored form of an expression ● multiply (apply the distributive property) to generate an equivalent expression. **Learning Goal 4:** Apply properties of operations (factor, distribute, and combine like terms) to generate equivalent expressions and to identify when two expressions are equivalent.
● 6.EE.B.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. ● 6.EE.B.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. ● 6.EE.B.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.	MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): Solving equations ● Solving an equation or inequality is a process of answering the question: determine which values from a specified set, if any, make the equation or inequality true. Students are able to: ● explain what the equality and inequality symbols including =, <, >, ≤, and ≥ represent. They determine if a number sentence is true or false based on the given symbol. ● identify values for the variables in equations and inequalities that result in true number sentences. ● identify values for the variables in equations and inequalities that result in false number sentences. ● learn the definition of solution in the context of placing a value into a variable to see if that value makes the equation true. ● solve one-step equations by relating an equation to a diagram and check to determine if their solution makes the equation true. ● calculate the solution of two-step equations by using their knowledge of order of operations and the properties of equality for addition, subtraction, multiplication, and division. ● employ tape diagrams to determine their answer and check to determine if their

		solution makes the equation true ● use their knowledge of simplifying expressions, order of operations, and properties of equality to calculate the solution of multi-step equations. ● use tables to determine their answer. ● check to determine if their solution makes the equation true. ● write expressions for solving real-world problems. **Learning Goal 5:** Use substitution to determine whether a given number makes an equation or inequality true. **Learning Goal 6:** Solve one-step, two-step and multi-step equations using a variety of strategies, and check to determine if a solution makes the equation true. **Learning Goal 7:** Solve real world problems by writing and solving equations of the form $x + p = q$ and $px = q$ (p, q, and x are non-negative rational numbers).
● 6.EE.B.8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): From equations to inequalities ● *An inequality may represent a constraint (or a condition) in a real-world problem.* ● *Infinity ($x > c$ and $x < c$ have an infinite number of solutions).* Students are able to: ● understand that an inequality with numerical expressions is either true or false. It is true if the numbers calculated on each side of the inequality sign result in a correct statement and is false otherwise. ● understand solving an inequality is answering the question of which values from a specified set, if any, make the inequality true. ● represent real-world constraint or condition by writing an inequality of the form $x > c$ or $x < c$. ● graph inequalities of the form $x > c$ or $x < c$ on number lines. ● recognize that inequalities of the form $x < c$ and $x > c$, where x is a variable and c is a fixed number, have infinitely many solutions when the values of x come

		from a set of rational numbers. **Learning Goal 8:** Write an inequality of the form x > c or x < c to represent a constraint or condition in a real world or mathematical problem and represent them on a number line.
• 6.EE.C.9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time*.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): Applications of equations ● *Two quantities that change in relationship to one another may be represented with an equation in two variables, with a graph, and with a table of values.* Students are able to: ● represent two quantities that related to one another, with variables. ● write an equation in two variables. ● distinguish the dependent variable from the independent variable. ● analyze a given graph and table of values, and relate them to the equation. **Learning Goal 9:** Write an equation using two variables (independent and dependent) to represent two quantities that change in relationship to one another in a real world problem. **Learning Goal 10:** Analyze the relationship between the dependent and independent variables and relate the equation to a given graph and to its table of values.
Interdisciplinary Connections: **NGSS Appendix for Alignment**	***Science:*** **MS-PS1 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use signed numbers, write and solve equations, and use order of magnitude thinking and basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science examples: (1) A pile of salt has mass 100 mg. How much chlorine is in it? Answer in milligrams. What would the answer be for a 500 mg pile of salt? (2) Twice as much water is twice as heavy. Explain why twice as much water isn't twice as dense. (3) Based on a model of a water molecule, recognize that any sample of water has a 2:1 ratio of hydrogen atoms to oxygen atoms. (4) Measure the mass and volume of a sample of reactant and compute its density. (5) Compare a measured/computed density to a nominal/textbook value, converting units as necessary. Determine the percent difference between the two.* *The Number System (6–8.NS). Science examples: Use positive and negative quantities to represent temperature changes in a chemical reaction (signs of energy released or absorbed).*	

	Statistics and Probability (6–8.SP). Science example: Compile all the boiling point measurements from the class into a line plot and discuss the distribution in terms of clustering and outliers. Why weren't all the measured values equal? How close is the average value to the nominal/textbook value? Show the average value and the nominal value on the line plot. **MS-PS2 As part of this work, teachers should give students opportunities to work with signed numbers and interpret expressions:** *The Number System (6–8.NS). Science examples: (1) Represent a third-law pair of forces as a 100 N force on one object and a −100N force on the other object. (2) Represent balanced forces on a single object as equal and opposite numbers 5 N. (3) Represent the net result of two or more forces as a sum of signed numbers. For example, given a large force and an oppositely directed small force, represent the net force as (100 N) + (−5 N) = 95 N. Relate the number sentence to the fact that the net effect on the motion is approximately what it would have been with only the large force* *Expressions and Equations (6–8.EE). Science example: Interpret an expression in terms of a physical context, e.g., interpret the expression F1 + F2 in a diagram as representing the net force on an object.* **MS-PS3 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships and basic statistics:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for kinetic energy vs. mass (holding speed constant). Decide whether the two quantities are in a proportional relationship, e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.* **MS-PS4 As part of this work, teachers should give students opportunities to use ratios and proportional relationships:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for wave energy vs. wave amplitude. Decide whether the two quantities are in a proportional relationship, (e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). (2) Interpret an idealized set of bivariate measurement data for wave energy vs. wave speed.* **MS-LS1 As part of this work, teachers should give students opportunities to use order of magnitude thinking, write and solve equations & analyze data:** *Expressions and Equations (6–8.EE). Science examples: (1) Quantify the sizes of cells and parts of cells, using convenient units such as microns.(2) Appreciate the orders of magnitude that span the difference in size between cells, molecules, and atoms. (3) Write a number sentence that expresses the conservation of mass as food moves through an organism. Assign values to the arrows in a diagram to show flows quantitatively. (4) Infer an unknown mass by using the concept of conservation to write and solve an equation with a variable.* **MS-LS2 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, write and solve equations, and use basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science example: Use ratios and unit rates as inputs for evaluating plans for maintaining biodiversity and ecosystem services (e.g., consider the net cost or net value of developing a wetland, using inputs such as the value of various wetland services in dollars per acre per year; in analyzing urban biodiversity, rank world cities by the amount of green space as a fraction of total land area; in analyzing social factors, determine the amount of green space per capita (m^2 per person)).* *Expressions and Equations (6–8.EE). Science examples: (1) Write a number sentence that expresses the conservation of total matter or energy in a system as matter or energy flows into, out of, and within it. Assign values to the arrows in a diagram to show flows quantitatively. (2) Infer an unknown matter or energy flow in a system by using the concept of conservation to write and solve an equation with a variable.* **MS-LS4 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships,**

	use concepts of probability, and use order of magnitude thinking: *Ratios and Proportional Relationships (6–7.RP) Science examples: Apply several ratios in combination to determine a net survival rate. For example, if 50 animals in a population have trait A while 50 have trait B, and each winter the survival rates are 80% for trait A and 60% for trait B, then how many of the animals with each trait will be alive after 1 winters? How about after 2 winters? 6 winters?* **MS-ESS2 As part of this work, teachers should give students opportunities to work with positive and negative numbers, and use order of magnitude thinking:** *The Number System (6–8.NS). Science examples: (1) Use positive and negative quantities to quantify changes in physical quantities such as atmospheric pressure and temperature; for example, if the temperature dropped from 24oC to 11oC, then the temperature change was −13oC. (2) Solve word problems relating to changes in signed physical quantities. For example, a shift in the jet stream caused a 10oC temperature increase in a single day; if the temperature before was −32oC, what was the temperature after?* **MS-ESS3 As part of this work, teachers should give students opportunities to use ratios and proportional relationships and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP). Science example: Work with measurement quantities that are formed through division, such as atmospheric concentration of CO_2, extraction cost per barrel of oil in different forms, per-capita consumption of given resources, flow rates in freshwater rivers, etc.* ***English-Language Arts:*** ***RI.6.4**. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.* ***W.6.2.** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.* *A. Introduce a topic and organize ideas, concepts, and information, using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.* *B. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.* *C. Use appropriate transitions to clarify the relationships among ideas and concepts.* *D. Use precise language and domain-specific vocabulary to inform about or explain the topic.* *E. Establish and maintain a formal/academic style, approach, and form.* *F. Provide a concluding statement or section that follows from the information or explanation presented.* ***W.6.4.** Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.6.7.** Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate. **W.6.8**. Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.* ***SL.6.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.* *A. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.* *B. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.*

	C. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. *D. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.* ***SL.6.2.** Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.* ***SL.6.3.** Deconstruct a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.* ***SL.6.4**. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).* ***SL.6.5.** Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.* ***SL.6.6**. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**
2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:

Green Township School District Grade 6 Mathematics Curriculum - Revised 2017

District/School Primary and Supplementary Resources	
Primary Resource: **Eureka Math (Unbound Ed - Module 4)**	**Supplementary Resources:** Number Talks: Building Numerical Reasoning Sadlier Progress In Mathematics Online Resources - Grade 6 ***Sadlier Progress in Mathematics*** Workbook ***Study Island*** ***Excel Math*** (Publisher: AnsMar) ***Khan Academy*** ***Learnzillion*** ***IXL*** Visual Patterns: Gr. K-12 Number Strings Common Core Progression Documents **Performance Tasks are available for use from the following sites:** Illustrative Mathematics Coherence Map Inside Mathematics Problems of the Month Grade 6 YouCubed Tasks
Suggested Tools & Representations:	**Suggested Tasks for Use During Unit**
❑ *Bar model* ❑ *Geometric figures* ❑ *Protractors*	6.EE.A.1 The Djinni's Offer 6.EE.A.2 Rectangle Perimeter 1 6.EE.A.4 Rectangle Perimeter 2 6.EE.A.4 Equivalent Expressions 6.EE.B.5 Make Use of Structure 6.EE.B.7 Morning Walk 6.EE.B.8 Fishing Adventures 1 6.EE.C.9 Families of Triangles 2015 EOY Released Items 6.EE.5 and 6.EE.7 - #24 2015 EOY Released Items 6.EE.1 and 6.EE.2 - #8, #23 2015 PBA Released Items 6.EE.5 and 6.EE.7 - #8, #10 2015 EOY Released Items 6.EE.4 and 6.EE.6 - #6, #7

	2015 PBA Released Items 6.EE.1 and 6.EE.2 - #5-7 2015 EOY Released Items 6.EE.C.9 - #26 2015 EOY Released Items 2015 PBA Released Items
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Sprints • Self-assessment by students with guidance from teacher. • Exit tickets • Khan Academy teacher reports • Star and Accelerated Math programs	• Teacher created assessments and projects • ***Sadlier*** Unit Assessments • ***Eureka Math*** Mid- and End- Module Assessments (Constructed response item with rubric) • Teacher/District created benchmark assessments
Instructional Best Practices and Exemplars	**Mathematical Terms/Vocabulary**
❑ *Math Work Stations* ❑ *Use Communicators/manipulatives* ❑ *Number talks* ❑ *Hands-on activities* ❑ *Exploratory activities* ❑ *Games/play* ❑ *Using concrete materials to advance conceptual understanding* ❑ *Use drawings and diagrams to advance conceptual understanding* ❑ *Connect current concepts to previously learned skills* ❑ *Small group instruction* ❑ *Whole class discussion* ❑ *Research* ❑ *Use of open educational resources for instruction or practice*	• **Equation** (An equation is a statement of equality between two expressions.) • **Equivalent Expressions** (Two simple expressions are equivalent if both evaluate to the same number for every substitution of numbers into all the letters in both expressions.) • **Exponential Notation for Whole Number Exponents** (Let m be a non-zero whole number. For any number a, we define a^m to be the product of m factors of a, i.e., $a^m = a \cdot a \cdot a \cdot a \ldots \cdot a$ ^{m} times . The number a is called the base, and m is called the exponent, or power of a.) • **Linear Expression** (A linear expression is a product of two simple expressions where only one of the simple expressions has letters and only one letter in each term of that expression or sums and/or differences of such products.) • **Simple Expression** (A simple expression is a number, a letter that represents a number, a product whose factors are either numbers or letters involving whole number exponents, or sums and/or differences of such products. Each product in a simple expression is called a term, and the evaluation of the numbers in the product is called the coefficient of the term.) • **Truth Values of a Number Sentence** (A number sentence is said to be true if both numerical expressions are equivalent; it is said to be false otherwise. True and false are called truth values.)
Focus Mathematical Concepts	

Grade Level Fluency Requirement:

- **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm.
- **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Prerequisite skills

Refer to Achieve the Core Coherence Map for full detail on vertical and horizontal alignment to prerequisite skills & future skills.

Coherence Map

Understand and apply properties of operations and the relationship between addition and subtraction.

1.OA.B.3 Apply properties of operations as strategies to add and subtract.[1] *Examples: If is known, then is also known. (Commutative property of addition.) To add , the second two numbers can be added to make a ten, so . (Associative property of addition.)*

Understand properties of multiplication and the relationship between multiplication and division.

3.OA.B.5 Apply properties of operations as strategies to multiply and divide.[2] *Examples: If is known, then is also known. (Commutative property of multiplication.) can be found by , then , or by , then . (Associative property of multiplication.) Knowing that and , one can find as (Distributive property.)*

Gain familiarity with factors and multiples.

4.OA.B.4 Find all factors for a whole number in the range –. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range – is a multiple of a given one-digit number. Determine whether a given whole number in the range – is prime or composite.

Geometric measurement: understand concepts of angle and measure angles.

4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through of a circle is called a "one-degree angle," and can be used to measure angles.

b. An angle that turns through one-degree angles is said to have an angle measure of degrees.

4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

4.MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

Write and interpret numerical expressions.

5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add and , then multiply by " as . Recognize that is three times as large as , without having to calculate the indicated sum or product.*

Analyze patterns and relationships.

5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add " and the starting number , and given the rule "Add " and the starting number , generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain*

informally why this is so.

Understand the place value system.

5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of , and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of . Use whole-number exponents to denote powers of .

Graph points on the coordinate plane to solve real-world and mathematical problems.

5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., -axis and -coordinate, -axis and -coordinate).

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Understand ratio concepts and use ratio reasoning to solve problems.

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took hours to mow lawns, then at that rate, how many lawns could be mowed in hours? At what rate were lawns being mowed?*

Compute fluently with multi-digit numbers and find common factors and multiples.

6.NS.B.4 Find the greatest common factor of two whole numbers less than or equal to and the least common multiple of two whole numbers less than or equal to . Use the distributive property to express a sum of two whole numbers – with a common factor as a multiple of a sum of two whole numbers with no common factor.

Common Misconceptions:

- Many of the misconceptions when dealing with expressions stem from the misunderstanding/reading of the expression. For example, knowing the operations that are being referenced with notation like: x3, 4x, 3(x + 2), x + 2y is critical. The fact that x^3 means x · x ·x, means x times x times x, not 3x or 3 times x;
- When evaluating 4x when x= 7, substitution does not result in the expression meaning 47. Use of the "x" notation as both the variable and the operation of multiplication can complicate this understanding.

Differentiation/Accommodations/Modifications
Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work
- Visual dictionaries to help build vocabulary
- Provide copy of classnotes
- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Unit 5: Area, Surface Area & Volume Problems **(Approximate Instructional Time: 5 weeks)**		
NJ Student Learning Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills** ***(Learning goals are for the Unit but may not necessarily be in sequential order.)***
● 6.G.A.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): Area of triangles, quadrilaterals, and polygons. Students are able to: ● show the area formula for the region bounded by a parallelogram by composing it into rectangles. ● understand that the area of a parallelogram is the area of the region bounded by the parallelogram. ● justify the area formula for a right triangle by viewing the right triangle as part of a rectangle composed of two right triangles. ● show the area formula for a triangular region by decomposing a triangle into right triangles. For a given triangle, the height of the triangle is the length of the altitude. The length of the base is called either the length base or, more commonly, the base. ● understand that the height of the triangle is the perpendicular segment from a vertex of a triangle to the line containing the opposite side. The opposite side is called the base. ● understand that any side of a triangle can be considered a base and that the choice of base determines the height. ● construct the altitude for three different cases: an altitude that is a side of a right angle, an altitude that lies over the base, and an altitude that is outside the triangle. ● deconstruct triangles to justify that the area of a triangle is exactly one half the area of a parallelogram. ● show the area formula for the region bounded by a polygon by decomposing the region into triangles and other polygons. They understand that the area of a polygon is actually the area of the region bounded by the polygon. ● find the area for the region bounded by a trapezoid by decomposing the region

		into two triangles. They understand that the area of a trapezoid is actually the area of the region bounded by the trapezoid. ● decompose rectangles to determine the area of other quadrilaterals ● compose rectangles and decompose into triangles in order to solve real-world problems. **Learning Goal 1:** Find the area of right triangles, other triangles, special quadrilaterals and polygons by composing into rectangles or decomposing into triangles and other shapes to solve real world or mathematical problems.
● 6.G.A.3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): Polygons on the coordinate plane Students are able to: ● use absolute value to determine distance between integers on the coordinate plane in order to find side lengths of polygons. ● Given coordinates for the vertices, students draw polygons in the coordinate plane. Students find the area enclosed by a polygon by composing or decomposing using polygons with known area formulas. ● name coordinates that define a polygon with specific properties. ● find the perimeter of irregular figures using coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. ● find the area enclosed by a polygon on the coordinate plane by composing or decomposing using polygons with known area formulas. ● determine distance, perimeter, and area in real-world contexts. **Learning Goal 2:** Solve real world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Use the absolute value of the differences of their coordinates to find distances between points with the same first coordinate or same second coordinate.

● 6.G.A.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = B\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	MP. 2 Reason abstractly and quantitatively.	Concept(s): Volume of right rectangular prisms Students are able to: ● pack a right rectangular prism with fractional edge lengths with unit fraction cubes. ● show that the volume found by packing is the same as would be found by multiplying the edge lengths of the prism. ● extend their understanding of the volume of a right rectangular prism with integer side lengths to right rectangular prisms with fractional side lengths. ● apply the formula $V = l \cdot w \cdot h$ to find the volume of a right rectangular prism with fractional lengths and use the correct volume units when writing the answer. ● extend the volume formula for a right rectangular prism to the formula $V =$ Area of Base · height. They understand that any face can be the base. ● develop, understand, and apply formulas for finding the volume of right rectangular prisms and cubes. ● understand that volume is additive and apply volume formulas to determine the volume of composite solid figures in real-world contexts. ● apply volume formulas to find missing volumes and missing dimensions. **Learning Goal 3:** Find the volume or missing edge length of a right rectangular prism with fractional edge lengths by packing it with unit cubes and show that the volume is the same as it would be if found by multiplying the edge lengths; apply volume formulas to right rectangular prisms with fractional edge lengths.
● 6.G.A.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically	Concept(s): Nets and surface area Students are able to: ● represent three dimensional objects with nets made up of rectangles and triangles. ● find surface area of three-dimensional objects using nets. ● solve real world and mathematical problems involving surface area using nets. **Learning Goal 4:** Represent three dimensional figures objects with nets made of

		rectangles and triangles, and use the nets to find the surface area of the figures in order to solve real world and mathematical problems.
Interdisciplinary Connections: **NGSS Appendix for Alignment**	***Science:*** **MS-PS1 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use signed numbers, write and solve equations, and use order of magnitude thinking and basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science examples: (1) A pile of salt has mass 100 mg. How much chlorine is in it? Answer in milligrams. What would the answer be for a 500 mg pile of salt? (2) Twice as much water is twice as heavy. Explain why twice as much water isn't twice as dense. (3) Based on a model of a water molecule, recognize that any sample of water has a 2:1 ratio of hydrogen atoms to oxygen atoms. (4) Measure the mass and volume of a sample of reactant and compute its density. (5) Compare a measured/computed density to a nominal/textbook value, converting units as necessary. Determine the percent difference between the two.* *The Number System (6–8.NS). Science examples: Use positive and negative quantities to represent temperature changes in a chemical reaction (signs of energy released or absorbed).* *Statistics and Probability (6–8.SP). Science example: Compile all the boiling point measurements from the class into a line plot and discuss the distribution in terms of clustering and outliers. Why weren't all the measured values equal? How close is the average value to the nominal/textbook value? Show the average value and the nominal value on the line plot.* **MS-PS2 As part of this work, teachers should give students opportunities to work with signed numbers and interpret expressions:** *The Number System (6–8.NS). Science examples: (1) Represent a third-law pair of forces as a 100 N force on one object and a −100N force on the other object. (2) Represent balanced forces on a single object as equal and opposite numbers 5 N. (3) Represent the net result of two or more forces as a sum of signed numbers. For example, given a large force and an oppositely directed small force, represent the net force as (100 N) + (−5 N) = 95 N. Relate the number sentence to the fact that the net effect on the motion is approximately what it would have been with only the large force* *Expressions and Equations (6–8.EE). Science example: Interpret an expression in terms of a physical context, e.g., interpret the expression F1 + F2 in a diagram as representing the net force on an object.* **MS-PS3 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships and basic statistics:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for kinetic energy vs. mass (holding speed constant). Decide whether the two quantities are in a proportional relationship, e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.* **MS-PS4 As part of this work, teachers should give students opportunities to use ratios and proportional relationships:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for wave energy vs. wave amplitude. Decide whether the two quantities are in a proportional relationship, (e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). (2) Interpret an idealized set of bivariate measurement data for wave energy vs. wave speed.* **MS-LS1 As part of this work, teachers should give students opportunities to use order of magnitude thinking, write and solve equations & analyze data:** *Expressions and Equations (6–8.EE). Science examples: (1) Quantify the sizes of cells and parts of cells, using convenient units such as microns.(2) Appreciate the orders of magnitude that span the difference in size between cells,*

	molecules, and atoms. (3) Write a number sentence that expresses the conservation of mass as food moves through an organism. Assign values to the arrows in a diagram to show flows quantitatively. (4) Infer an unknown mass by using the concept of conservation to write and solve an equation with a variable. **MS-LS2 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, write and solve equations, and use basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science example: Use ratios and unit rates as inputs for evaluating plans for maintaining biodiversity and ecosystem services (e.g., consider the net cost or net value of developing a wetland, using inputs such as the value of various wetland services in dollars per acre per year; in analyzing urban biodiversity, rank world cities by the amount of green space as a fraction of total land area; in analyzing social factors, determine the amount of green space per capita (m^2 per person)).* *Expressions and Equations (6–8.EE). Science examples: (1) Write a number sentence that expresses the conservation of total matter or energy in a system as matter or energy flows into, out of, and within it. Assign values to the arrows in a diagram to show flows quantitatively. (2) Infer an unknown matter or energy flow in a system by using the concept of conservation to write and solve an equation with a variable.* **MS-LS4 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use concepts of probability, and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP) Science examples: Apply several ratios in combination to determine a net survival rate. For example, if 50 animals in a population have trait A while 50 have trait B, and each winter the survival rates are 80% for trait A and 60% for trait B, then how many of the animals with each trait will be alive after 1 winters? How about after 2 winters? 6 winters?* **MS-ESS2 As part of this work, teachers should give students opportunities to work with positive and negative numbers, and use order of magnitude thinking:** *The Number System (6–8.NS). Science examples: (1) Use positive and negative quantities to quantify changes in physical quantities such as atmospheric pressure and temperature; for example, if the temperature dropped from 24oC to 11oC, then the temperature change was −13oC. (2) Solve word problems relating to changes in signed physical quantities. For example, a shift in the jet stream caused a 10oC temperature increase in a single day; if the temperature before was −32oC, what was the temperature after?* **MS-ESS3 As part of this work, teachers should give students opportunities to use ratios and proportional relationships and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP). Science example: Work with measurement quantities that are formed through division, such as atmospheric concentration of CO_2, extraction cost per barrel of oil in different forms, per-capita consumption of given resources, flow rates in freshwater rivers, etc.* ***English-Language Arts:*** ***RI.6.4****. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.* ***W.6.2.*** *Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.* *A. Introduce a topic and organize ideas, concepts, and information, using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.* *B. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.* *C. Use appropriate transitions to clarify the relationships among ideas and concepts.*

	D. Use precise language and domain-specific vocabulary to inform about or explain the topic. *E. Establish and maintain a formal/academic style, approach, and form.* *F. Provide a concluding statement or section that follows from the information or explanation presented.* ***W.6.4.*** *Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.6.7.*** *Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.* ***W.6.8****. Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.* ***SL.6.1.*** *Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.* *A. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.* *B. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.* *C. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.* *D. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.* ***SL.6.2.*** *Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.* ***SL.6.3.*** *Deconstruct a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.* ***SL.6.4****. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).* ***SL.6.5.*** *Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.* ***SL.6.6****. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**

2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Please see relevant projects for technology standards 8.1 and 8.2:

District/School Primary and Supplementary Resources	
Primary Resource: **Eureka Math (Unbound Ed - Module 5)**	**Supplementary Resources:** Number Talks: Building Numerical Reasoning Sadlier Progress In Mathematics Online Resources - Grade 6 ***Sadlier Progress in Mathematics*** Workbook ***Study Island*** ***Excel Math*** (Publisher: AnsMar) ***Khan Academy*** ***Learnzillion*** ***IXL*** Visual Patterns: Gr. K-12 Number Strings Common Core Progression Documents **Performance Tasks are available for use from the following sites:**

	Illustrative Mathematics Coherence Map Inside Mathematics Problems of the Month Grade 6 YouCubed Tasks
Suggested Tools & Representations:	**Suggested Tasks for Use During Unit**
❑ *Coordinate Planes* ❑ *Nets* ❑ *Prisms* ❑ *Rulers*	6.G.A.1, 6.G.A.3 Polygons in the Coordinate Plane 6.G.A.2 Volumes with Fractional Edge Lengths 6.G.A.4 Nets for Pyramids and Prisms 2015 EOY Released Items 6.G.A.1 and 6.G.A.3 - #17, #31 2015 EOY Released Items 6.G.A.2 and 6.G.A.4 - #17, #29, #30 2015 EOY Released Items 2015 PBA Released Items
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Sprints • Self-assessment by students with guidance from teacher. • Exit tickets • Khan Academy teacher reports • Star and Accelerated Math programs	• Teacher created assessments and projects • ***Sadlier*** Unit Assessments • ***Eureka Math*** Mid- and End- Module Assessments (Constructed response item with rubric) • Teacher/District created benchmark assessments
Instructional Best Practices and Exemplars	**Mathematical Terms/Vocabulary**
❑ *Math Work Stations* ❑ *Use Communicators/manipulatives* ❑ *Number talks* ❑ *Hands-on activities*	• **Altitude and Base of a Triangle** (An altitude of a triangle is a perpendicular segment from a vertex of a triangle to the line containing the opposite side. The opposite side is called the base. For every triangle, there are three choices for the altitude, and hence there are three base-altitude pairs. The height of a

- ❑ *Exploratory activities*
- ❑ *Games/play*
- ❑ *Using concrete materials to advance conceptual understanding*
- ❑ *Use drawings and diagrams to advance conceptual understanding*
- ❑ *Connect current concepts to previously learned skills*
- ❑ *Small group instruction*
- ❑ *Whole class discussion*
- ❑ *Research*
- ❑ *Use of open educational resources for instruction or practice*

triangle is the length of the altitude. The length of the base is called either the base length or, more commonly, the base. Usually, context makes it clear whether the base refers to a number or a segment. These terms can mislead students: base suggests the bottom, while height usually refers to vertical distances. Do not reinforce these impressions by consistently displaying all triangles with horizontal bases.)

- **Cube** (A cube is a right rectangular prism all of whose edges are of equal length.)
- **Hexagon** (Given 6 different points A, B, C, D, E, and F in the plane, a 6-sided polygon, or hexagon, is the union of 6 segments AB, BC, CD, DE, EF, and FA such that (1) the segments intersect only at their endpoints, and (2) no two adjacent segments are collinear. For both pentagons and hexagons, the segments are called the sides, and their endpoints are called the vertices. Like quadrilaterals, pentagons and hexagons can be denoted by the order of vertices defining the segments. For example, the pentagon $ABCDE$ has vertices A, B, C, D, and E that define the 5 segments in the definition above. Similar to quadrilaterals, pentagons and hexagons also have interiors, which can be described using pictures in elementary school.)
- **Line Perpendicular to a Plane** (A line L intersecting a plane E at a point P is said to be perpendicular to the plane E if L is perpendicular to every line that (1) lies in E and (2) passes through the point P. A segment is said to be perpendicular to a plane if the line that contains the segment is perpendicular to the plane. In Grade 6, a line perpendicular to a plane can be described using a picture.)
- **Parallel Planes** (Two planes are parallel if they do not intersect. In Euclidean geometry, a useful test for checking whether two planes are parallel is if the planes are different and if there is a line that is perpendicular to both planes.)
- **Pentagon** (Given 5 different points A, B, C, D, and E in the plane, a 5-sided polygon, or pentagon, is the union of 5 segments AB, BC, CD, DE, and EA such that (1) the segments intersect only at their endpoints, and (2) no two adjacent segments are collinear.)
- **Right Rectangular Prism** (Let E and E' be two parallel planes. Let B be a rectangular region 4 in the plane E. At each point P of B, consider the segment PP' perpendicular to E, joining P to a point P' of the plane E'. The union of all these segments is called a right rectangular prism. It can be shown that the region B' in E' corresponding to the region B is also a rectangular region whose sides are equal in length to the corresponding sides of B. The regions B and B' are called the base faces (or just bases) of the prism. It can also be shown that

	the planar region between two corresponding sides of the bases is also a rectangular region called the lateral face of the prism. In all, the boundary of a right rectangular prism has 6 faces: the 2 base faces and 4 lateral faces. All adjacent faces intersect along segments called edges—base edges and lateral edges.) ● **Surface of a Prism** (The surface of a prism is the union of all of its faces—the base faces and lateral faces.) ● **Triangular Region** (A triangular region is the union of the triangle and its interior.)

Focus Mathematical Concepts

Grade Level Fluency Requirement:

- **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm.
- **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Prerequisite skills

Refer to Achieve the Core Coherence Map for full detail on vertical and horizontal alignment to prerequisite skills & future skills.

Coherence Map

Reason with shapes and their attributes.

1.G.A.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.[1]

2.G.A.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

3.G.A.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual*

fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[2]

Geometric measurement: understand conceptual concepts of volume and relate volume to multiplication and to addition.

5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.C.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Graph points on a coordinate plane to solve real-world and mathematical problems.

5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Classify two-dimensional figures into categories based on their properties.

5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*

Apply and extend previous understandings of numbers to the system of rational numbers.

6.NS.C.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Reason about and solve one-variable equations and inequalities.

6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

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[1] Students do not need to learn formal names such as "right rectangular prism."

[2] Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a

fraction by a fraction is not a requirement at this grade.

Common Misconceptions:

- Students mix up the concepts of perimeter and area if not given a strong conceptual understanding that is connected to the vocabulary.

Differentiation/Accommodations/Modifications

Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work
- Visual dictionaries to help build vocabulary
- Provide copy of classnotes
- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments
- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom
- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments
- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments
- Extended time on classroom tests and quizzes.

- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Green Township School District Grade 6 Mathematics Curriculum - Revised 2017

Unit 6: Statistics **(Approximate Instructional Time: 5 weeks)**		
NJ Student Learning Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills** ***(Learning goals are for the Unit but may not necessarily be in sequential order.)***
● 6.SP.A.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision	Concept(s): Understanding Distributions ● *Variability/Variation* ● *A statistical question is one that anticipates variability in the data that is related to the question.* Students are able to: ● distinguish between statistical questions and those that are not statistical. ● formulate a statistical question and explain what data could be collected to answer the question. ● distinguish between categorical data and numerical data. **Learning Goal 1:** Distinguish questions that are statistical (anticipate variability in data) from those that are not.
● 6.SP.A.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. ● 6.SP.A.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. ● 6.SP.B.4. Display numerical data in	MP.4 Model with mathematics.	Concept(s): Understanding and summarizing distributions ● *A data set has a distribution which can be described by its center, spread, and overall shape.* ● *A measure of center summarizes, with a single number, the values of an entire data set.* ● *A measure of variation describes, with a single number, how the values of a data set vary.* Students are able to: ● distinguish center from variation. ● Given a dot plot, students begin describing the distribution of the points on the dot plot in terms of center and variability. ● create a dot plot of a given data set

plots on a number line, including dot plots, histograms, and box plots.		● summarize a given data set using equal length intervals and construct a frequency table. ● Based on a frequency table, students describe the distribution. ● construct a frequency histogram and recognize that the number of intervals may affect the shape of a histogram. ● construct a relative frequency histogram and recognize that the shape of a histogram does not change when relative frequency is used compared to when frequency is used to construct the histogram. ● display numerical data in histograms on a number line. ● display numerical data in box plots on a number line. **Learning Goal 2**: Display numerical data in plots on the number line (including dot plots, histograms, and box plots) and summarize in relation to their context.
● 6.SP.B.5. Summarize numerical data sets in relation to their context, such as by: ● 6.SP.B.5a. Reporting the number of observations. ● 6.SP.B.5b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. ● 6.SP.B.5c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. ● 6.SP.B.5d. Relating the choice	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): Measures of center and variability Students are able to: ● define the center of a data distribution by a “fair share” value called the mean. ● connect the “fair share” concept with a mathematical formula for finding the mean. ● characterize the center of a distribution by its mean in the sense of a balance point. ● understand that the mean is a balance point by calculating the distances of the data points from the mean and call the distances, deviations. ● understand that the mean is the value such that the sum of the deviations is equal to zero ● interpret the mean of a data set as a “typical” value. ● compare and contrast two small data sets that have the same mean but different amounts of variability. ● see that a data distribution is not characterized only by its center. Its spread or variability must be considered as well. ● informally evaluate how precise the mean is as an indicator of the typical value of a distribution, based on the variability exhibited in the data. ● use dot plots to order distributions according to the variability around the mean

of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.		for each of the data distributions ● calculate the mean absolute deviation (MAD) for a given data set. ● interpret the MAD as the average distance of data values from the mean. ● calculate the mean and MAD for a data distribution. ● use the mean and MAD to describe a data distribution in terms of center and variability. ● use the mean and MAD to describe similarities and differences between two distributions. ● Given a data set, students calculate the median of the data and estimate the percent of values above and below the median value ● Given a set of data, students describe how the data might have been collected. ● describe the unit of measurement for observations in a data set. ● calculate the median of the data. ● describe the variability in the data by calculating the interquartile range. ● construct a box plot from a given set of data ● Given a box plot, students summarize the data by the 5-number summary (Min, Q1, Median, Q3, Max.) ● describe a set of data using the 5-number summary and the interquartile range. ● construct a box plot from a 5-number summary **Learning Goal 3:** Summarize numerical data in relation to their context by identifying the number of observations and describing how the data was measured. **Learning Goal 4*:*** Calculate, and interpret measures of center (mean and median) and variability (interquartile range and mean absolute deviation); report measures of center and variability appropriate to the shape of the distribution and context.
Interdisciplinary Connections: **NGSS Appendix for Alignment**	***Science:*** **MS-PS1 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use signed numbers, write and solve equations, and use order of magnitude thinking and basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science examples: (1) A pile of salt has mass 100 mg. How much chlorine is in it? Answer in milligrams. What would the answer be for a 500 mg pile of salt? (2) Twice as much water is twice as heavy. Explain why twice as much water isn't twice as dense. (3) Based on a model of a water molecule, recognize that any sample of water has a 2:1 ratio of*	

	hydrogen atoms to oxygen atoms. (4) Measure the mass and volume of a sample of reactant and compute its density. (5) Compare a measured/computed density to a nominal/textbook value, converting units as necessary. Determine the percent difference between the two. *The Number System (6–8.NS). Science examples: Use positive and negative quantities to represent temperature changes in a chemical reaction (signs of energy released or absorbed).* *Statistics and Probability (6–8.SP). Science example: Compile all the boiling point measurements from the class into a line plot and discuss the distribution in terms of clustering and outliers. Why weren't all the measured values equal? How close is the average value to the nominal/textbook value? Show the average value and the nominal value on the line plot.* **MS-PS2 As part of this work, teachers should give students opportunities to work with signed numbers and interpret expressions:** *The Number System (6–8.NS). Science examples: (1) Represent a third-law pair of forces as a 100 N force on one object and a −100N force on the other object. (2) Represent balanced forces on a single object as equal and opposite numbers 5 N. (3) Represent the net result of two or more forces as a sum of signed numbers. For example, given a large force and an oppositely directed small force, represent the net force as (100 N) + (−5 N) = 95 N. Relate the number sentence to the fact that the net effect on the motion is approximately what it would have been with only the large force* *Expressions and Equations (6–8.EE). Science example: Interpret an expression in terms of a physical context, e.g., interpret the expression F1 + F2 in a diagram as representing the net force on an object.* **MS-PS3 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships and basic statistics:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for kinetic energy vs. mass (holding speed constant). Decide whether the two quantities are in a proportional relationship, e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.* **MS-PS4 As part of this work, teachers should give students opportunities to use ratios and proportional relationships:** *Ratios and Proportional Relationships (6–7.RP) Science examples: (1) Analyze an idealized set of bivariate measurement data for wave energy vs. wave amplitude. Decide whether the two quantities are in a proportional relationship, (e.g., by testing for equivalent ratios or graphing on a coordinate plane and observing whether the graph is a straight line through the origin). (2) Interpret an idealized set of bivariate measurement data for wave energy vs. wave speed.* **MS-LS1 As part of this work, teachers should give students opportunities to use order of magnitude thinking, write and solve equations & analyze data:** *Expressions and Equations (6–8.EE). Science examples: (1) Quantify the sizes of cells and parts of cells, using convenient units such as microns.(2) Appreciate the orders of magnitude that span the difference in size between cells, molecules, and atoms. (3) Write a number sentence that expresses the conservation of mass as food moves through an organism. Assign values to the arrows in a diagram to show flows quantitatively. (4) Infer an unknown mass by using the concept of conservation to write and solve an equation with a variable.* **MS-LS2 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, write and solve equations, and use basic statistics:** *Ratios and Proportional Relationships (6–7.RP). Science example: Use ratios and unit rates as inputs for evaluating plans for maintaining biodiversity and ecosystem services (e.g., consider the net cost or net value of developing a wetland, using inputs such as the value of various wetland services in dollars per acre per year; in analyzing urban biodiversity, rank world cities by the amount of green space as a fraction of total land area; in analyzing social factors, determine the amount of green space per capita (m^2 per person)).*

	Expressions and Equations (6–8.EE). *Science examples: (1) Write a number sentence that expresses the conservation of total matter or energy in a system as matter or energy flows into, out of, and within it. Assign values to the arrows in a diagram to show flows quantitatively. (2) Infer an unknown matter or energy flow in a system by using the concept of conservation to write and solve an equation with a variable.* **MS-LS4 As part of this work, teachers should give students opportunities to work with ratios and proportional relationships, use concepts of probability, and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP) Science examples: Apply several ratios in combination to determine a net survival rate. For example, if 50 animals in a population have trait A while 50 have trait B, and each winter the survival rates are 80% for trait A and 60% for trait B, then how many of the animals with each trait will be alive after 1 winters? How about after 2 winters? 6 winters?* **MS-ESS2 As part of this work, teachers should give students opportunities to work with positive and negative numbers, and use order of magnitude thinking:** *The Number System (6–8.NS). Science examples: (1) Use positive and negative quantities to quantify changes in physical quantities such as atmospheric pressure and temperature; for example, if the temperature dropped from 24oC to 11oC, then the temperature change was −13oC. (2) Solve word problems relating to changes in signed physical quantities. For example, a shift in the jet stream caused a 10oC temperature increase in a single day; if the temperature before was −32oC, what was the temperature after?* **MS-ESS3 As part of this work, teachers should give students opportunities to use ratios and proportional relationships and use order of magnitude thinking:** *Ratios and Proportional Relationships (6–7.RP). Science example: Work with measurement quantities that are formed through division, such as atmospheric concentration of CO_2, extraction cost per barrel of oil in different forms, per-capita consumption of given resources, flow rates in freshwater rivers, etc.* ***English-Language Arts:*** ***RI.6.4****. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.* ***W.6.2.*** *Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.* *A. Introduce a topic and organize ideas, concepts, and information, using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia) when useful to aiding comprehension.* *B. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.* *C. Use appropriate transitions to clarify the relationships among ideas and concepts.* *D. Use precise language and domain-specific vocabulary to inform about or explain the topic.* *E. Establish and maintain a formal/academic style, approach, and form.* *F. Provide a concluding statement or section that follows from the information or explanation presented.* ***W.6.4.*** *Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)* ***W.6.7.*** *Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.* ***W.6.8****. Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.*

	SL.6.1. *Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.* *A. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.* *B. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.* *C. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.* *D. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.* ***SL.6.2.*** *Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.* ***SL.6.3.*** *Deconstruct a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.* ***SL.6.4****. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).* ***SL.6.5.*** *Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.* ***SL.6.6****. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.*
21st Century Skills/ Career Ready Practices:	**CRP1. Act as a responsible and contributing citizen and employee.** **CRP2. Apply appropriate academic and technical skills.** **CRP3. Attend to personal health and financial well-being.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP9. Model integrity, ethical leadership and effective management.** **CRP10. Plan education and career paths aligned to personal goals.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**
2014 NJ Technology Standards:	**8.1 Educational Technology** (Word | PDF) All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge. **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming** (Word | PDF) All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

	Please see relevant projects for technology standards 8.1 and 8.2:

District/School Primary and Supplementary Resources	
Primary Resource: **Eureka Math (Unbound Ed - Module 6)**	**Supplementary Resources:** Number Talks: Building Numerical Reasoning Sadlier Progress In Mathematics Online Resources - Grade 6 ***Sadlier Progress in Mathematics*** Workbook ***Study Island*** ***Excel Math*** (Publisher: AnsMar) ***Khan Academy*** ***Learnzillion*** ***IXL*** Visual Patterns: Gr. K-12 Number Strings Common Core Progression Documents **Performance Tasks are available for use from the following sites:** Illustrative Mathematics Coherence Map Inside Mathematics Problems of the Month Grade 6 YouCubed Tasks
Suggested Tools & Representations:	**Suggested Tasks for Use During Unit**
❑ *Dot Plots* ❑ *Histograms* ❑ *Box Plots*	6.SP.A.1 Identifying Statistical Questions 6.SP.A.2, 6.SP.B.4 Puppy Weights 6.SP.A.3 Is It Center or Is It Variability? 6.SP.B.5c Number of Siblings 6.SP.B.5d Mean or Median? (Learnzillion lesson on variability) 2015 EOY Released Items 6.SP.A.1, 6.SP.A.2,6.SP.A.3, 6.SP.A.4, 6.SP.A.5 - #9-#11, #25 2015 EOY Released Items

District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
• Teacher observation of students engaged in group and independent activities. • Individual and small group conferences/interviews to assess understanding with rubric • Sprints • Self-assessment by students with guidance from teacher. • Exit tickets • Khan Academy teacher reports • Star and Accelerated Math programs	• Teacher created assessments and projects • ***Sadlier*** Unit Assessments • ***Eureka Math*** Mid- and End- Module Assessments (Constructed response item with rubric) • Teacher/District created benchmark assessments • *Mammoth Math Gr. 6 End of Year Procedural Assessment* • *Mammoth Math Gr. 6 End of Year Procedural Assessment Answer Key*
Instructional Best Practices and Exemplars	**Mathematical Terms/Vocabulary**
❑ *Math Work Stations* ❑ *Use Communicators/manipulatives* ❑ *Number talks* ❑ *Hands-on activities* ❑ *Exploratory activities* ❑ *Games/play* ❑ *Using concrete materials to advance conceptual understanding* ❑ *Use drawings and diagrams to advance conceptual understanding* ❑ *Connect current concepts to previously learned skills* ❑ *Small group instruction* ❑ *Whole class discussion* ❑ *Research* ❑ *Use of open educational resources for instruction or practice*	• **Statistical Question** (A question that anticipates variability in the data that would be collected in order to answer the question.) • **Median** (A measure of center appropriate for skewed data distributions. It is the middle value when the data are ordered from smallest to largest if there are an odd number of observations and half way between the middle two observations if the number of observations is even.) • **Mean** (A measure of center appropriate for data distributions that are approximately symmetric. It is the average of the values in the data set. Two common interpretations of the mean are as a "fair share" and as the balance point of the data distribution.) • **Dot Plot** (A plot of numerical data along a number line.) • **Histogram** (A graphical representation of a numerical data set that has been grouped into intervals. Each interval is represented by a bar drawn above that interval that has a height corresponding to the number of observations in that interval.) • **Box Plot** (A graph of five numerical summary measures: the minimum, lower quartile, median, upper quartile, and the maximum. It conveys information about center and variability in a data set.) • **Variability** (Variability in a data set occurs when the observations in the data set are not all the same.) • **Deviations from the Mean** (The differences calculated by subtracting the mean from the observations in a data set.) • **Mean Absolute Deviation** (MAD) (A measure of variability appropriate for data distributions that are approximately symmetric. It is the average of the

	absolute value of the deviations from the mean.) ● **Interquartile Range** (IQR) (A measure of variability appropriate for data distributions that are skewed. It is the difference between the upper quartile and the lower quartile of a data set and describes how spread out the middle 50% of the data are.)

Focus Mathematical Concepts

Grade Level Fluency Requirement:

- ❖ **6.NS.B.2** Fluently divide multi-digit numbers using the standard algorithm.
- ❖ **6.NS.B.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Prerequisite skills

Refer to Achieve the Core Coherence Map for full detail on vertical and horizontal alignment to prerequisite skills & future skills.

Coherence Map

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.B.5 Fluently multiply multi-digit whole numbers using the standard algorithm.

5.NBT.B.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Represent and interpret data.

5.MD.B.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

Apply and extend previous understandings of arithmetic to algebraic expressions.

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.*

b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6 s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.*

Common Misconceptions:

- Students may believe all graphical displays are symmetrical. Exposing students to graphs of various shapes will show this to be false.
- The value of a measure of center describes the data, rather than a value used to interpret and describe the data.
- Students often use words to help them recall how to determine the measures of center. However, student's lack of understanding of what the measures of center actually represent tends to confuse them. Median is the number in the middle, but that middle number can only be determined after the data entries are arranged in ascending or descending order. Mode is remembered as the "most," and often students think this means the largest value, not the "most frequent" entry in the set. Vocabulary is important in mathematics, but conceptual understanding is equally as important. Usually the mean, mode, or median have different values, but sometimes those values are the same.

Differentiation/Accommodations/Modifications

Gifted and Talented

(content, process, product and learning environment)

Extension Activities

- Conduct research and provide presentation of various topics.
- Design surveys to generate and analyze data to be used in discussion.
- Debate topics of interest / cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts.
- Exploration of art and/or artists to understand society and history.
- Implement RAFT Activities as they pertain to the types / modes of communication (role, audience, format, topic).

Anchor Activities

- Use of Higher Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice.
- Model skills/techniques that need to be mastered.
- Extended time to complete class work
- Visual dictionaries to help build vocabulary
- Provide copy of classnotes
- Pair with a peer for assistance during class

Modifications for Homework/Assignments

- Modified Assignments
- Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(**appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team**)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests

- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
- Student may take/complete tests in an alternate setting as needed.
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests.
- Establish procedures for accommodations / modifications for assessments.

Students at Risk of School Failure

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Repetition and practice
- Model skills / techniques to be mastered.
- Extended time to complete class work
- Provide copy of classnotes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments.
- Establish expectations for correct spelling on assignments.
- Extra textbooks for home.
- Student may request books on tape / CD / digital media, as available and appropriate.
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/ school communication
- Teachers will check/sign student agenda daily

- Student requires use of other assistive technology device

Modifications for Homework and Assignments

- Extended time to complete assignments.
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, topic).

Modifications for Assessments

- Extended time on classroom tests and quizzes.
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- Establish procedures for accommodations / modifications for assessments.