Grade 7: Unit 1
Operations on Rational Numbers & Expressions
Course Philosophy/Description

In mathematics, students will learn to address a range of tasks focusing on the application of concepts, skills and understandings. Students will be asked to solve problems involving the key knowledge and skills for their grade level as identified by the NJSLS; express mathematical reasoning and construct a mathematical argument and apply concepts to solve model real world problems. The balanced math instructional model will be used as the basis for all mathematics instruction.

Seventh grade Mathematics consists of the following domains: Ratios and Proportional Relationships (RP), The Number System (NS), Expressions and Equations (EE), Geometry (G), and Statistics and Probability (SP). In seventh grade, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

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

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

3) Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity in Grade 8 they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

4) Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.
This ESL framework was designed to be used by bilingual, dual language, ESL and general education teachers. Bilingual and dual language programs use the home language and a second language for instruction. ESL teachers and general education or bilingual teachers may use this document to collaborate on unit and lesson planning to decide who will address certain components of the SLO and language objective. ESL teachers may use the appropriate leveled language objective to build lessons for ELLs which reflects what is covered in the general education program. In this way, whether it is a pull-out or push-in model, all teachers are working on the same Student Learning Objective connected to the New Jersey Student Learning Standards. The design of language objectives are based on the alignment of the World-Class Instructional Design Assessment (WIDA) Consortium’s English Language Development (ELD) standards with the New Jersey Student Learning Standards (NJSLS). WIDA’s ELD standards advance academic language development across content areas ultimately leading to academic achievement for English learners. As English learners are progressing through the six developmental linguistic stages, this framework will assist all teachers who work with English learners to appropriately identify the language needed to meet the requirements of the content standard. At the same time, the language objectives recognize the cognitive demand required to complete educational tasks. Even though listening and reading (receptive) skills differ from speaking and writing (expressive) skills across proficiency levels the cognitive function should not be diminished. For example, an Entering Level One student only has the linguistic ability to respond in single words in English with significant support from their home language. However, they could complete a Venn diagram with single words which demonstrates that they understand how the elements compare and contrast with each other or they could respond with the support of their home language (L1) with assistance from a teacher, para-professional, peer or a technology program.

http://www.state.nj.us/education/modelcurriculum/ela/ELLOverview.pdf
<table>
<thead>
<tr>
<th>#</th>
<th>Student Learning Objective</th>
<th>NJSLS</th>
<th>Instruction: 8 weeks</th>
<th>Assessment: 1 week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Describe real-world situations in which (positive and negative) rational numbers are combined, emphasizing rational numbers that combine to make 0. Represent sums of rational numbers ((p + q)) on horizontal and vertical number lines, showing that the distance along the number line is (</td>
<td>q</td>
<td>) and including situations in which (q) is negative and positive.</td>
<td>7.NS.A.1a, 1b</td>
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<tr>
<td>2</td>
<td>Add and subtract (positive and negative) rational numbers, showing that the distance between two points on a number line is the absolute value of their difference and representing subtraction using an additive inverse.</td>
<td>7.NS.A.1c, 1d</td>
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<td>3</td>
<td>Multiply and divide signed numbers, including rational numbers, and interpret the products and quotients using real-world contexts.</td>
<td>7.NS.A.2a</td>
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<tr>
<td>4</td>
<td>Convert a rational number to a decimal using long division and explain why the decimal is either a terminating or repeating decimal.</td>
<td>7.NS.A.2b, 2d</td>
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<tr>
<td>5</td>
<td>Apply properties of operations as strategies to add, subtract, multiply, and divide rational numbers.</td>
<td>7.NS.A.2c, 2d</td>
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<tr>
<td>6</td>
<td>Solve mathematical and real-world problems involving addition, subtraction, multiplication, and division of signed rational numbers.</td>
<td>7.NS.A.2c, 2d</td>
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<tr>
<td>7</td>
<td>Apply the properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</td>
<td>7.EE.A.1</td>
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<tr>
<td>8</td>
<td>Rewrite algebraic expressions in equivalent forms to highlight how the quantities in it are related.</td>
<td>7.EE.A.2</td>
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</tbody>
</table>
Research about Teaching and Learning Mathematics

Structure teaching of mathematical concepts and skills around problems to be solved (Checkly, 1997; Wood & Sellars, 1996; Wood & Sellars, 1997)
Encourage students to work cooperatively with others (Johnson & Johnson, 1975; Davidson, 1990)
Use group problem-solving to stimulate students to apply their mathematical thinking skills (Artzt & Armour-Thomas, 1992)
Students interact in ways that support and challenge one another’s strategic thinking (Artzt, Armour-Thomas, & Curcio, 2008)
Activities structured in ways allowing students to explore, explain, extend, and evaluate their progress (National Research Council, 1999)

There are three critical components to effective mathematics instruction (Shellard & Moyer, 2002):

- Teaching for conceptual understanding
- Developing children’s procedural literacy
- Promoting strategic competence through meaningful problem-solving investigations

Teachers should be:

- Demonstrating acceptance and recognition of students’ divergent ideas
- Challenging students to think deeply about the problems they are solving, extending thinking beyond the solutions and algorithms required to solve the problem
- Influencing learning by asking challenging and interesting questions to accelerate students’ innate inquisitiveness and foster them to examine concepts further
- Projecting a positive attitude about mathematics and about students’ ability to “do” mathematics

Students should be:

- Actively engaging in “doing” mathematics
- Solving challenging problems
- Investigating meaningful real-world problems
- Making interdisciplinary connections
- Developing an understanding of mathematical knowledge required to “do” mathematics and connect the language of mathematical ideas with numerical representations
- Sharing mathematical ideas, discussing mathematics with one another, refining and critiquing each other’s ideas and understandings
- Communicating in pairs, small group, or whole group presentations
- Using multiple representations to communicate mathematical ideas
- Using connections between pictures, oral language, written symbols, manipulative models, and real-world situations
- Using technological resources and other 21st century skills to support and enhance mathematical understanding
Mathematics is not a stagnant field of textbook problems; rather, it is a dynamic way of constructing meaning about the world around us, generating knowledge and understanding about the real world every day. Students should be metaphorically rolling up their sleeves and “doing mathematics” themselves, not watching others do mathematics for them or in front of them. (Protheroe, 2007)

Balanced Mathematics Instructional Model

Balanced math consists of three different learning opportunities; guided math, shared math, and independent math. Ensuring a balance of all three approaches will build conceptual understanding, problem solving, computational fluency, and procedural fluency. Building conceptual understanding is the focal point of developing mathematical proficiency. Students should frequently work on rigorous tasks, talk about the math, explain their thinking, justify their answer or process, build models with graphs or charts or manipulatives, and use technology.

When balanced math is used in the classroom it provides students opportunities to:

- solve problems
- make connections between math concepts and real-life situations
- communicate mathematical ideas (orally, visually and in writing)
- choose appropriate materials to solve problems
- reflect and monitor their own understanding of the math concepts
- practice strategies to build procedural and conceptual confidence

Teacher builds conceptual understanding by modeling through demonstration, explicit instruction, and think alouds, as well as guiding students as they practice math strategies and apply problem solving strategies. (whole group or small group instruction)

Students practice math strategies independently to build procedural and computational fluency. Teacher assesses learning and reteaches as necessary. (whole group instruction, small group instruction, or centers)

Teacher and students practice mathematics processes together through interactive activities, problem solving, and discussion. (whole group or small group instruction)
## Effective Pedagogical Routines/Instructional Strategies

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<th>Analyze Student Work</th>
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<tr>
<td>Connect Previous Knowledge to New Learning</td>
<td>Identify Student’s Mathematical Understanding</td>
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<td>Making Thinking Visible</td>
<td>Identify Student’s Mathematical Misunderstandings</td>
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<td>Develop and Demonstrate Mathematical Practices</td>
<td>Interviews</td>
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<tr>
<td>Inquiry-Oriented and Exploratory Approach</td>
<td>Role Playing</td>
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<tr>
<td>Multiple Solution Paths and Strategies</td>
<td>Diagrams, Charts, Tables, and Graphs</td>
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<tr>
<td>Use of Multiple Representations</td>
<td>Anticipate Likely and Possible Student Responses</td>
</tr>
<tr>
<td>Explain the Rationale of your Math Work</td>
<td>Collect Different Student Approaches</td>
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<tr>
<td>Quick Writes</td>
<td>Multiple Response Strategies</td>
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<td>Pair/Trio Sharing</td>
<td>Asking Assessing and Advancing Questions</td>
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<td>Turn and Talk</td>
<td>Revoicing</td>
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<td>Charting</td>
<td>Marking</td>
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<td>Gallery Walks</td>
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<td>Small Group and Whole Class Discussions</td>
<td>Challenging</td>
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<td>Student Modeling</td>
<td>Pressing for Accuracy and Reasoning</td>
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<td></td>
<td>Maintain the Cognitive Demand</td>
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</tbody>
</table>
# Educational Technology

## Standards

| 8.1.8.A.1, 8.1.8.A.3, 8.1.8.E.1, 8.2.8.C.8, 8.2.8.E.3 |

- **Technology Operations and Concepts**
  - Demonstrate knowledge of a real world problem using digital tools.
    - **Example:** Students use Integer Football 1 game to reinforce adding positive and negative integers on a horizontal number line. [http://www.mathgoodies.com/games/integer_game/football.html](http://www.mathgoodies.com/games/integer_game/football.html)
  - Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
    - **Example:** Students can create two separate number line models and represent subtraction using the additive inverse. [http://www.saddleback.edu/faculty/lperez/algebra2go/tools/addsubnumline/index.html](http://www.saddleback.edu/faculty/lperez/algebra2go/tools/addsubnumline/index.html)

- **Research and Information Fluency**
  - Effectively use of a variety of search tools and filters in professional public databases to find information to solve a real world problem.
    - **Example:** Students can search through Learnzillion, Imagine Math Facts and other interactive sites for appropriate instructional videos and/or information pertaining to strategies and modeling for integer operations and signed rational numbers.

- **Design**
  - Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
    - **Example:** Students can create a number line model and explain the reasoning represented in the solution model. [http://www.saddleback.edu/faculty/lperez/algebra2go/tools/addnumberline/index.html](http://www.saddleback.edu/faculty/lperez/algebra2go/tools/addnumberline/index.html)

- **Computational Thinking: Programming:**
  - Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
    - **Example:** Student can use conceptual investigations to create algorithms for each math operation (add, subtract, multiply or divide) using positive and negative integers.
Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

- **CRP2. Apply appropriate academic and technical skills.**
  Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

  **Example:** Students will apply prior knowledge when solving real world problems. Students will make sound judgements about the use of specific tools, such as horizontal and vertical number lines to explore and deepen their understanding of adding and subtracting integers.

- **CRP4. Communicate clearly and effectively and with reason.**
  Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others’ time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

  **Example:** Students will on a daily basis communicate their reasoning behind their solution paths by making connections to the context and the quantities, using proper vocabulary, along with decontextualizing and/or contextualizing the problem. Students will create representations using colored counting chips for integer operations. They will also explain the meaning behind the quantities and units involved. Students will also ask probing questions to clarify and improve arguments.

- **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**
  Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
Career Ready Practices

**Example:** Throughout their daily lessons, students will understand the meaning of a problem and look for entry points into solving their problems by analyzing the relationships of the quantities, constraints and goals of the task. Plans for solution paths will be made and have meaning. Students will self-monitor, evaluate and critique their process and progress as they are working and make changes as necessary.

- **CRP12. Work productively in teams while using cultural global competence.**
  Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

  **Example:** Students will work in collaborative and whole group settings to develop various solutions to math tasks that are presented to them. They will work together to understand the terms of the problem, ask clarifying and challenging questions among each other, and develop agreed upon solutions using a variety of strategies and models. Students will listen to, read and discuss arguments with each other with respect and courtesy at all times and will be willing to assist those that may need assistance. In this unit students will demonstrate and explain to a peer or small group how to multiply and divide signed numbers.
WIDA Proficiency Levels

At the given level of English language proficiency, English language learners will process, understand, produce or use:

<table>
<thead>
<tr>
<th>Level</th>
<th>Proficiency Description</th>
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</table>
| 6- Reaching | • Specialized or technical language reflective of the content areas at grade level  
• A variety of sentence lengths of varying linguistic complexity in extended oral or written discourse as required by the specified grade level  
• Oral or written communication in English comparable to proficient English peers |
| 5- Bridging | • Specialized or technical language of the content areas  
• A variety of sentence lengths of varying linguistic complexity in extended oral or written discourse, including stories, essays or reports  
• Oral or written language approaching comparability to that of proficient English peers when presented with grade level material. |
| 4- Expanding | • Specific and some technical language of the content areas  
• A variety of sentence lengths of varying linguistic complexity in oral discourse or multiple, related sentences or paragraphs  
• Oral or written language with minimal phonological, syntactic or semantic errors that may impede the communication, but retain much of its meaning, when presented with oral or written connected discourse, with sensory, graphic or interactive support |
| 3- Developing | • General and some specific language of the content areas  
• Expanded sentences in oral interaction or written paragraphs  
• Oral or written language with phonological, syntactic or semantic errors that may impede the communication, but retain much of its meaning, when presented with oral or written, narrative or expository descriptions with sensory, graphic or interactive support |
| 2- Beginning | • General language related to the content area  
• Phrases or short sentences  
• Oral or written language with phonological, syntactic, or semantic errors that often impede of the communication when presented with one to multiple-step commands, directions, or a series of statements with sensory, graphic or interactive support |
| 1- Entering | • Pictorial or graphic representation of the language of the content areas  
• Words, phrases or chunks of language when presented with one-step commands directions, WH-, choice or yes/no questions, or statements with sensory, graphic or interactive support |
Language Development Supports For English Language Learners
To Increase Comprehension and Communication Skills

**Environment**
- Welcoming and stress-free
- Respectful of linguistic and cultural diversity
- Honors students' background knowledge
- Sets clear and high expectations
- Includes routines and norms
- Is thinking-focused vs. answer-seeking
- Offers multiple modalities to engage in content learning and to demonstrate understanding
- Includes explicit instruction of specific language targets
- Provides participation techniques to include all learners
- Integrates learning centers and games in a meaningful way
- Provides opportunities to practice and refine receptive and productive skills in English as a new language
- Integrates meaningful and purposeful tasks/activities that:
  - Are accessible by all students through multiple entry points
  - Are relevant to students’ lives and cultural experiences
  - Build on prior mathematical learning
  - Demonstrate high cognitive demand
  - Offer multiple strategies for solutions
  - Allow for a language learning experience in addition to content

<table>
<thead>
<tr>
<th>Sensory Supports*</th>
<th>Graphic Supports*</th>
<th>Interactive Supports*</th>
<th>Verbal and Textual Supports</th>
</tr>
</thead>
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<tr>
<td>Real-life objects (realia) or concrete objects</td>
<td>Graphs</td>
<td>In a whole group</td>
<td>Labeling</td>
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<tr>
<td>Physical models</td>
<td>Charts</td>
<td>In a small group</td>
<td>Students’ native language</td>
</tr>
<tr>
<td>Manipulatives</td>
<td>Timelines</td>
<td>With a partner such as Turn-and-Talk</td>
<td>Modeling</td>
</tr>
<tr>
<td>Pictures &amp; photographs</td>
<td>Number lines</td>
<td>In pairs as a group (first, two pairs work independently, then they form a group of four)</td>
<td>Repetitions</td>
</tr>
<tr>
<td>Visual representations or models such as diagrams or drawings</td>
<td>Graphic organizers</td>
<td>In triads</td>
<td>Paraphrasing</td>
</tr>
<tr>
<td>Videos &amp; films</td>
<td>Graphing paper</td>
<td>Cooperative learning structures such as Think-Pair-Share</td>
<td>Summarizing</td>
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<tr>
<td>Newspapers or magazines</td>
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<td>Interactive websites or software</td>
<td>Guiding questions</td>
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<tr>
<td>Gestures</td>
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<td>With a mentor or coach</td>
<td>Clarifying questions</td>
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<tr>
<td>Physical movements</td>
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<td>Probing questions</td>
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<tr>
<td>Music &amp; songs</td>
<td></td>
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<td>Leveled questions such as What? When? Where? How? Why?</td>
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</tbody>
</table>

BUILDING EQUITY IN YOUR TEACHING PRACTICE

How do the essential questions highlight the connection between the big ideas of the unit and equity in your teaching practice?

- **CONTENT INTEGRATION**
  - Teachers use examples and content from a variety of cultures & groups.
  - This unit / lesson is connected to other topics explored with students.
  - There are multiple viewpoints reflected in the content of this unit / lesson.
  - The materials and resources are reflective of the diverse identities and experiences of students.
  - The content affirms students, as well as exposes them to experiences other than their own.

- **KNOWLEDGE CONSTRUCTION**
  - Teachers help students understand how knowledge is created and influenced by cultural assumptions, perspectives & biases.
  - This unit / lesson provides context to the history of privilege and oppression.
  - This unit / lesson addresses power relationships.
  - This unit / lesson helps students to develop research and critical thinking skills.
  - This curriculum creates windows and mirrors* for students.

- **PREJUDICE REDUCTION**
  - Teachers implement lessons and activities to assert positive images of ethnic groups & improve intergroup relations.
  - This unit / lesson helps students question and unpack biases & stereotypes.
  - This unit / lesson helps students examine, research and question information and sources.
  - The curriculum encourages discussion and understanding about the groups of people being represented.
  - This unit / lesson challenges dominant perspectives.

- **EQUITABLE PEDAGOGY**
  - Teachers modify techniques and methods to facilitate the academic achievement of students from diverse backgrounds.
  - The instruction has been modified to meet the needs of each student.
  - Students feel respected and their cultural identities are valued.
  - Additional supports have been provided for students to become successful and independent learners.
  - Opportunities are provided for student to reflect on their learning and provide feedback.

- **EMPOWERING SCHOOL CULTURE**
  - Using the other four dimensions to create a safe and healthy educational environment for all.
  - There are opportunities for students to connect with the community.
  - My classroom is welcoming and supportive for all students?
  - I am aware of and sensitive to the needs of my students and their families.
  - There are effective parent communication systems established. Parents can talk to me about issues as they arise in my classroom.

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# Culturally Relevant Pedagogy Examples

- **Problem-Based Learning Scenarios**: Present relatable real-world problems for your students to solve, explicitly referencing cultures and communities when applicable.  
  **Example**: Explain the game of American football to the students. Have students watch parts of the 2018 Superbowl game and record the yards gained and lost. Then have the students add and subtract the integers. The following link is a condensed version of the Superbowl: [https://www.youtube.com/watch?v=jePmBziRnRo](https://www.youtube.com/watch?v=jePmBziRnRo) (Do not show the entire video. Show portions of the game that you have planned ahead of time.)

- **Integrate Relevant Word Problems**: Contextualize equations using word problems that reference student interests and cultures.  
  **Example**: Create and use word problems that students relate to, have prior knowledge of and includes their interest. These can include current events and/or relevant real-world situations. Using content that students can relate to adds meaning, value and connection. The following link provides you with a variety of word problems that are current, relevant to real-world and student interests: [https://www.yummymath.com/](https://www.yummymath.com/)

- **Use Learning Stations**: Provide a range of material by setting up learning stations.  
  **Example**: Reinforce understandings of concepts and skills by promoting learning through student interests, modalities, experiences and/or prior knowledge. Encourage the students to make content choices based upon their strengths, needs, values and experiences. Providing students with choice boards will give them a sense of ownership to their learning and understanding.

- **Present New Concepts Using Student Vocabulary**: Use student diction to capture attention and build understanding before using academic terms.  
  **Example**: Teach math vocabulary in various modalities to increase students’ retention. Use multi-modal activities, analogies, realia, visual cues, graphic representations, gestures, pictures, practice and cognates. Inform students that some vocabulary words have multiple meanings. Have students create the Word Wall with their definitions and examples to foster ownership. Work with students to create a sorting and matching game using vocabulary words from within the unit. Students can work in teams or individually to play these games. This will allow students to familiarize themselves with the vocabulary words within the unit.
## Differentiated Instruction

### Accommodate Based on Students Individual Needs: Strategies

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<th>Processing</th>
<th>Comprehension</th>
<th>Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra time for assigned tasks</td>
<td>Extra Response time</td>
<td>Precise processes for balanced</td>
<td>Teacher-made checklist</td>
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<tr>
<td>Adjust length of assignment</td>
<td>Have students verbalize steps</td>
<td>math instructional model</td>
<td>Use visual graphic organizers</td>
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<td>Timeline with due dates for reports</td>
<td>Repeat, clarify or reword</td>
<td>Short manageable tasks</td>
<td>Reference resources to promote</td>
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<td>and projects</td>
<td>directions</td>
<td>Brief and concrete directions</td>
<td>independence</td>
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<tr>
<td>Communication system</td>
<td>Mini-breaks between tasks</td>
<td>Provide immediate feedback</td>
<td>Visual and verbal reminders</td>
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<td>between home and school</td>
<td>Provide a warning for</td>
<td>Small group instruction</td>
<td>Graphic organizers</td>
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<td></td>
<td>transitions</td>
<td>Emphasize multi-sensory learning</td>
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<td></td>
<td>Partnering</td>
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<thead>
<tr>
<th>Assistive Technology</th>
<th>Tests/Quizzes/Grading</th>
<th>Behavior/Attention</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer/whiteboard</td>
<td>Extended time</td>
<td>Consistent daily structured</td>
<td>Individual daily planner</td>
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<tr>
<td>Tape recorder</td>
<td>Study guides</td>
<td>routine</td>
<td>Display a written agenda</td>
</tr>
<tr>
<td>Video Tape</td>
<td>Shortened tests</td>
<td>Simple and clear classroom rules</td>
<td>Note-taking assistance</td>
</tr>
<tr>
<td></td>
<td>Read directions aloud</td>
<td>Frequent feedback</td>
<td>Color code materials</td>
</tr>
</tbody>
</table>

| Organization                          |                                |                                            |                                        |
|---------------------------------------|--------------------------------|--------------------------------------------|                                        |
### Differentiated Instruction

**Accommodate Based on Students Individual Needs: Strategies**

- Anchor charts to model strategies and use of formulas
- Reference sheets that list formulas, step-by-step procedures and model strategies
- Conceptual word wall that contains definitions, translation, pictures and/or examples
- Graphic organizers (examples include: Venn diagram, 4 square graphic organizer for math word problems, K-W-L etc.)
- Translation dictionary
- Teacher modeling
- Four-function calculator to assist with computations
- Students can utilize math journals to write notes, copy solution steps, and translate terms and key vocabulary
- Highlight and label the solution steps for multi-step problems in different colors
- Utilize technological programs which provide verbal and visual instruction in native and/or second language
- Use interactive technology to improve multiplication fact fluency and accuracy
- Use a story context or visual to model math operations with signed rational numbers
- Use concrete models (counting chips), drawings (horizontal and vertical number lines), and interactive technology to explain the reasoning used to complete mathematical operations with signed integers
- Use interactive technology to create two separate number line models and represent subtraction using the additive inverse
- Multiplication charts to assist with multiplication and division automaticity
Interdisciplinary Connections

Model interdisciplinary thinking to expose students to other disciplines.

Social Studies Connection:

Differences of Integers (6.2.8.B.2.a and 6.2.8.B.2.b)
- Students will compare the elevations between two geographical locations using rational numbers.

Science Connection:

Positive and Negative Numbers in Context (MS-ESS2-4 and MS-ESS3-5)
- It is intended to help identify and aid students who have difficulties in ordering, comparing, adding, and subtracting positive and negative integers. Particular attention is paid to the use of negative numbers on number lines to explore the structures as students investigate temperature changes between cities.

ELA Connection:

Various Tasks: (RL.7.1 and RI.7.1)
- Students will be able to read, analyze, and cite informational text to solve problems and explain their reasoning of how the task was solved. Students will also focus on vocabulary, mechanics and grammar in effective writing.
Enrichment

What is the purpose of Enrichment?

- The purpose of enrichment is to provide extended learning opportunities and challenges to students who have already mastered, or can quickly master, the basic curriculum. Enrichment gives the student more time to study concepts with greater depth, breadth, and complexity.
- Enrichment also provides opportunities for students to pursue learning in their own areas of interest and strengths.
- Enrichment keeps advanced students engaged and supports their accelerated academic needs.
- Enrichment provides the most appropriate answer to the question, “What do you do when the student already knows it?”

Enrichment is…

- Planned and purposeful
- Different, or differentiated, work – not just more work
- Responsive to students’ needs and situations
- A promotion of high-level thinking skills and making connections within content
- The ability to apply different or multiple strategies to the content
- The ability to synthesize concepts and make real world and cross-curricular connections
- Elevated contextual complexity
- Sometimes independent activities, sometimes direct instruction
- Inquiry based or open ended assignments and projects
- Using supplementary materials in addition to the normal range of resources
- Choices for students
- Tiered/Multi-level activities with flexible groups (may change daily or weekly)

Enrichment is not…

- Just for gifted students (some gifted students may need intervention in some areas just as some other students may need frequent enrichment)
- Worksheets that are more of the same (busywork)
- Random assignments, games, or puzzles not connected to the content areas or areas of student interest
- Extra homework
- A package that is the same for everyone
- Thinking skills taught in isolation
- Unstructured free time
Assessments

Required District/State Assessments
Unit Assessments
PARCC
SGO Assessments

Suggested Formative/Summative Classroom Assessments
Describe Learning Vertically
Identify Key Building Blocks
Make Connections (between and among key building blocks)
Short/Extended Constructed Response Items
Multiple-Choice Items (where multiple answer choices may be correct)
Drag and Drop Items
Use of Equation Editor
Quizzes
Journal Entries/Reflections/Quick-Writes
Accountable talk
Projects
Portfolio
Observation
Graphic Organizers/Concept Mapping
Presentations
Role Playing
Teacher-Student and Student-Student Conferencing
Homework
New Jersey Student Learning Standards

7.NS.A.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line.

7.NS.A.1a: Describe situations in which opposite quantities combine to make 0. For example, In the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?

7.NS.A.1b: Understand \( p + q \) as the number located a distance \(|q|\) from \( p \), in the positive or negative direction depending on whether \( q \) is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

7.NS.A.1c: Understand subtraction of rational numbers as adding the additive inverse, \( p - q = p + (-q) \). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

7.NS.A.1d: Apply properties of operations as strategies to add and subtract rational numbers.

7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

7.NS.A.2a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as \((-1)(-1) = 1\) and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

7.NS.A.2b: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If \( p \) and \( q \) are integers, then \(-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}\). Interpret quotients of rational numbers by describing real-world contexts.

7.NS.A.2c: Apply properties of operations as strategies to multiply and divide rational numbers.

7.NS.A.2d: Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
# New Jersey Student Learning Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.NS.A.3</strong>:</td>
<td>Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)</td>
</tr>
<tr>
<td><strong>7.EE.A.1</strong>:</td>
<td>Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</td>
</tr>
<tr>
<td><strong>7.EE.A.2</strong>:</td>
<td>Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. <em>For example,</em> $a + 0.05a = 1.05a$ <em>means that &quot;increase by 5%&quot; is the same as &quot;multiply by 1.05.&quot;</em></td>
</tr>
<tr>
<td>Mathematical Practices</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>1. Make sense of problems and persevere in solving them.</td>
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</tr>
<tr>
<td>2. Reason abstractly and quantitatively.</td>
<td></td>
</tr>
<tr>
<td>3. Construct viable arguments and critique the reasoning of others.</td>
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</tr>
<tr>
<td>4. Model with mathematics.</td>
<td></td>
</tr>
<tr>
<td>5. Use appropriate tools strategically.</td>
<td></td>
</tr>
<tr>
<td>6. Attend to precision.</td>
<td></td>
</tr>
<tr>
<td>7. Look for and make use of structure.</td>
<td></td>
</tr>
<tr>
<td>8. Look for and express regularity in repeated reasoning.</td>
<td></td>
</tr>
<tr>
<td>Grade: Seven</td>
<td>Unit: 1 (One)</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
</tbody>
</table>

**NJSLS:**
7.NS.A.1a,b,c,d, 7.NS.A.2a,b,c,d, 7.NS.A.3, 7.EE.A.1, 7.EE.A.2

**Unit Focus:**
- Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
- Use properties of operations to generate equivalent expressions.

**New Jersey Student Learning Standards:**
7.NS.A.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line.

7.NS.A.1a: Describe situations in which opposite quantities combine to make 0. For example, In the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?

7.NS.A.1b: Understand $p + q$ as the number located a distance $|q|$ from $p$, in the positive or negative direction depending on whether $q$ is Positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

**Student Learning Objective 1:** Describe real-world situations in which (positive and negative) rational numbers are combined, emphasizing rational numbers that combine to make 0. Represent sums of rational numbers ($p + q$) on horizontal and vertical number lines, showing that the distance along the number line is $|q|$ and including situations in which $q$ is negative and positive.

**Modified Student Learning Objectives/Standards:**
M.EE.7.NS.A.1: Add fractions with like denominators (halves, thirds, fourths, and tenths) with sums less than or equal to one.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
### 7.NS.A.1b

- Tasks do not have a context.
- Tasks are not limited to integers.
- Tasks involve a number line.
- Tasks do not require students to show in general that a number and its opposite have a sum of 0.
- Tasks require students to produce or recognize real-world contexts that correspond to given sums of rational numbers.

| MP 2 | Opposite quantities combine to make 0 (additive inverses). $p + q$ is the number located a distance $|q|$ from $p$, the positive or negative direction depending on whether $q$ is positive or negative. Subtraction of rational numbers is the same as adding the additive inverse, $p - q = p + (-q)$. The product of two whole numbers is the total number of objects in a number of equal groups. **Students are able to:**
|     | - Represent addition and subtraction on a horizontal number line.  
|     | - Represent addition and subtraction on a vertical number line.  
|     | - Interpret sums of rational numbers in real-world situations.  
|     | - Show that the distance between two rational numbers on the number line is the absolute value of their difference. Visual representations may be helpful as students begin this work; they become less necessary as students become more fluent with these operations. The expectation of the NJSL is to build on student understanding of number lines developed in 6th grade. |
| MP 3 | Addition and subtraction of rational numbers can be represented by movement on a number line, because the sum (or difference) is another rational number whose location is determined by its magnitude and sign. Two opposite numbers combine to make zero because they represent the same distance from zero on the number line. The sum of two numbers $p$ and $q$ on the number line, because addition can be modeled by movement along the number line. When $q$ is a positive number, $p + q$ is to the right of $p$. When $q$ is a negative number, $p + q$ is to the left of $p$. The sum of a number and its opposite, $p + (-p)$ is equal to zero because $p$ and $-p$ are the same distance from 0 in opposite directions. When should we use additive inverse or multiplicative inverse? |
| MP 5 | IFL Task(s) – Set of Related Lessons named “Adding and Subtracting Positive and Negative Rational Numbers” |
| MP 7 | IFL PBA Task(s):  
|     | Weights of Candies  
|     | High and Low Elevations  
|     | Additional Tasks/Activities:  
|     | Distances On The Number Line 2  
<p>|     | Opposite Quantities Combine to Make Zero |</p>
<table>
<thead>
<tr>
<th>SPED Strategies:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create examples and describe situations in which opposite quantities combine to make zero.</td>
</tr>
<tr>
<td>Demonstrate that a number and its opposite have a sum of 0 (are additive inverses).</td>
</tr>
<tr>
<td>Interpret sums of rational numbers by describing real-world contexts such as temperature, depth and altitude, football and bank accounts.</td>
</tr>
<tr>
<td>Demonstrate the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.</td>
</tr>
<tr>
<td>Create numbers throughout the learning environment (i.e. floor, desk, wall, construction paper etc.).</td>
</tr>
<tr>
<td>Present information through different modalities.</td>
</tr>
<tr>
<td>Use graph paper.</td>
</tr>
<tr>
<td>Adjust color of numbers, graphs and visual content.</td>
</tr>
<tr>
<td>Include written descriptions for graphics, images and videos.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources: UDL - Visual and Auditory Learner(s) 7.NS.A.1</th>
</tr>
</thead>
</table>

How do we use a number line to show addition and subtraction of rational numbers?
<table>
<thead>
<tr>
<th>ELL Strategies:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilize thermometer manipulatives.</td>
<td></td>
</tr>
<tr>
<td>Create actual number line utilizing resources.</td>
<td></td>
</tr>
<tr>
<td>Peer coaching with students in different groups.</td>
<td></td>
</tr>
<tr>
<td>Translated math glossary should be provided.</td>
<td></td>
</tr>
<tr>
<td>Math journal for students to note questions and concerns should be used.</td>
<td></td>
</tr>
<tr>
<td>Use of word/picture wall.</td>
<td></td>
</tr>
<tr>
<td>L1 (students’ native language) text and/or support should be provided.</td>
<td></td>
</tr>
<tr>
<td>Pictures/illustrations</td>
<td></td>
</tr>
<tr>
<td>Provide graphic organizers.</td>
<td></td>
</tr>
<tr>
<td>Develop graphic representations of number lines and show multiple examples.</td>
<td></td>
</tr>
</tbody>
</table>

**Website:**

**Teachers First Adapt a Strategy. Adjusting Lessons for ESL/ELL students**

http://www.teachersfirst.com/content/esl/adaptsтрат.cfm
New Jersey Student Learning Standards:
7.NS.A.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line.

7.NS.A.1c: Understand subtraction of rational numbers as adding the additive inverse, \( p - q = p + (-q) \). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

7.NS.A.1d: Apply properties of operations as strategies to add and subtract rational numbers.

Student Learning Objective 2: Add and subtract (positive and negative) rational numbers, showing that the distance between two points on a number line is the absolute value of their difference and representing subtraction using an additive inverse.

Modified Student Learning Objectives/Standards:
MEE.7.NS.A.1: Add fractions with like denominators (halves, thirds, fourths, and tenths) with sums less than or equal to one.

<table>
<thead>
<tr>
<th>MPs</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>7.NS.A.1c</td>
<td>Opposite quantities combine to make 0 (additive inverses).</td>
<td>The sum of a number and its opposite, ( p + -p ), is equal to zero because ( p ) and (-p) are the same distance from 0 in opposite directions.</td>
<td>IFL Task(s) – Set of Related Lessons named “Adding and Subtracting Positive and Negative Rational Numbers”</td>
</tr>
<tr>
<td>MP 3</td>
<td>7.NS.A.1c</td>
<td>( p + q ) is the number located a distance (</td>
<td>q</td>
<td>) from ( p ), in the positive or negative direction depending on whether ( q ) is positive or negative.</td>
</tr>
<tr>
<td>MP 5</td>
<td>7.NS.A.1c</td>
<td>Subtraction of rational numbers is the same as adding the additive inverse, ( p - q = p + (-q) ).</td>
<td></td>
<td>Weights of Candies</td>
</tr>
<tr>
<td>MP 7</td>
<td>7.NS.A.1c</td>
<td>Students are able to:</td>
<td></td>
<td>High and Low Elevations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Represent addition and subtraction on a horizontal number line.</td>
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</tr>
</tbody>
</table>
rather require students to demonstrate conceptual understanding, for example, by identifying a difference that is equivalent to a given difference. For example, given the difference $-1/3 - (1/5 + 5/8)$, the student might be asked to recognize the equivalent expression $-1/3 + -(1/5 + 5/8)$.

7.NS.A.1d

- Tasks may involve sums and differences of 2 or 3 rational numbers.
- Tasks require students to demonstrate conceptual understanding, for example, by producing or recognizing an expression equivalent to a given sum or difference. For example, given the sum $-8.1 + 7.4$, the student might be asked to recognize or produce the equivalent expression $-(8.1 - 7.4)$.

| Represent addition and subtraction on a vertical number line. |
| Interpret sums of rational numbers in real-world situations. |
| Show that the distance between two rational numbers on the number line is the absolute value of their difference. |

Visual representations may be helpful as students begin this work; they become less necessary as students become more fluent with these operations. The expectation of the NJSL is to build on student understanding of number lines developed in 6th grade.

**SPED Strategies:**
- Create examples of situations in which opposite quantities combine to make zero.
- Create and describe situations in which opposite quantities combine to make 0.
- Demonstrate that a number and its opposite have a sum of 0 (are additive inverses).
- Interpret sums of rational numbers by describing real-world contexts such as temperature, depth, altitude, football and bank accounts.
- Demonstrate that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- negative, both are located at a point $q$ units to the right of $p$.

The distance between a positive number $p$ and negative number $q$ is the sum of their absolute values because this represents each of their distances from zero and therefore their total distance from each other.

Rational numbers can be decomposed and regrouped to efficiently add and subtract positive and negative integers.

The difference $b-a$ and $a-b$ are opposites because they represent the same distance between two points on the number line. Subtraction of a lesser number minus a greater number will result in a negative difference, while subtraction of a greater number minus a lesser number will result in a positive difference.

The order of values being added does not affect the sum, but the order of the values being subtracted does affect the difference because $a + b$ models the same movement on
Create numbers throughout the learning environment (i.e. floor, desk, wall, construction paper etc.).

Present information through different modalities.

Use graph paper.

Use number line model for operation with integers.

Adjust color of numbers, graphs and visual content.

Include written descriptions for graphics, images and videos.

Use a foldable for integer rules.

**Resources:** UDL - Visual and Auditory Learner(s).

7.NS.A.1
https://youtu.be/1tT8a8Ah8-s

7.NS.1-3 - Adding and Subtracting Fractions
https://youtu.be/mcQGg-kDLyw

**ELL Strategies:**
Utilize thermometer manipulatives.

Create actual number line utilizing resources.

the number line as $b + a$, while $a-b$ and $b-a$ model movement in opposite directions on the number line.

How do the properties of operation help us compute with rational numbers?

How do we use a number line to show addition and subtraction of rational numbers?
| **Peer coaching with students in different groups.** Translated math glossary should be provided. |
| **Math journal for students to note questions and concerns should be provided.** |
| **Word/picture wall should be displayed or provided to the student.** |
| **L1 (students’ native language) text and/or support should be used.** |
| **Pictures/illustrations should be provided.** |
| **Provide graphic organizers** |
| **Develop graphic representations of number lines and show multiple examples.** |
New Jersey Student Learning Standards:

7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

7.NS.A.2a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as \((-1)\)(\(-1\)) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

Student Learning Objective 3: Multiply and divide signed numbers, including rational numbers, and interpret the products and quotients using real-world contexts.

Modified Student Learning Objectives/Standards:

M.EE.7.NS.A.2.a: Solve multiplication problems with products to 100.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 2 MP 4 MP 7 | 7.NS.A.2a  
- Tasks do not have a context.  
- Tasks require students to demonstrate conceptual understanding, for example by providing students with a numerical expression and requiring students to produce or recognize an equivalent expression using properties of operations. For example, given the expression \((-3)(6 + -4 + -3)\), the student might be asked to recognize that Every quotient of integers (with non-zero divisor) is a rational number.  
Decimal form of a rational number terminates in 0’s or eventually repeats.  
Integers can be divided, provided that the divisor is not zero.  
If \(p\) and \(q\) are integers, then \(-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}\).  
Students are able to:  
- Multiply and divide signed numbers.  
**SPED Strategies:** Review properties (i.e. communicative, associative, distributive, identity etc.). |  
What models and relationships help you make sense of multiplying and dividing positive and negative numbers?  
Understand that multiplication and division of whole numbers is extended to integers by requiring that operations continue to satisfy properties of operations.  
What is the result of adding a number and its inverse or multiplying a number and its inverse? | Division of Integers  
The Green Fundraiser  
Multiplying Rational Numbers  
Patterns of Multiplication and Division |
the given expression is equivalent to $(-3)(6 + -4) + (-3)(-3)$.

Utilize color counters.

Review and chart rules for multiplying integers.

Describe real-world contexts with usage of adding and subtracting (positive and negative).

Provide mental imagery for mathematical idea (i.e. bank account ledger).

Create and provide a list of properties of operations as strategies to multiply and divide rational numbers.

Create a rational number conversion chart for decimals using long division; know that the decimal form of a rational number terminates in 0’s or eventually repeats.

Review multiplication and division of rational numbers as an extension of multiplication and division of integers.

Provide or create a multiplication chart.

**Instructional Resources: UDL - Visual and Auditory Learner(s).**

*Operation Properties Commutative Property 7.NS.A.1d and 7.NS.A.2c*

[https://youtu.be/5RZwBqvMVMI](https://youtu.be/5RZwBqvMVMI)

<table>
<thead>
<tr>
<th>How are the operations applied in real-world contexts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do the properties of operations help us compute with rational numbers?</td>
</tr>
<tr>
<td>What is the relationship between multiplication and division?</td>
</tr>
</tbody>
</table>
**ELL Strategies:**
Initiate discussions and provide opportunities for collaboration.

Highlight mathematical relationships; utilize various colors to show distinctions.

Provide multiplication and division chart to 100.

Teacher partially completes the equation and labels essential terms.

Interactive tools that can be used in many ways to build language as well as math skills.

Whiteboards for students to write the equations dictated by the teacher.

Utilize pictures and photographs to show ELLs examples of class vocabulary and concepts.

Demonstrate and explain to a peer or small group how to multiply and divide signed numbers.
### New Jersey Student Learning Standards:

**7.NS.A.2**: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

**7.NS.A.2b**: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If $p$ and $q$ are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

**7.NS.A.2d**: Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0’s or eventually repeats.

### Student Learning Objective 4:
Convert a rational number to a decimal using long division and explain why the decimal is either a terminating or repeating decimal.

### Modified Student Learning Objectives/Standards:

**M.EE.7.NS.A.2.b**: Solve division problems with divisors up to five and also with a divisor of 10 without remainders.

<table>
<thead>
<tr>
<th>MPs</th>
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<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>7.NS.A.2b</td>
<td>Every quotient of integers (with non-zero divisor) is a rational number.</td>
<td>What models and relationships help you make sense of multiplying and dividing positive and negative numbers?</td>
<td>Converting Rational Numbers to Decimals Using Long Division</td>
</tr>
<tr>
<td>MP 4</td>
<td>Tasks do not have a context.</td>
<td>Decimal form of a rational number terminates in 0’s or eventually repeats.</td>
<td>Understand that multiplication and division of whole numbers is extended to integers by requiring that operations continue to satisfy properties of operations.</td>
<td></td>
</tr>
<tr>
<td>MP 7</td>
<td>Tasks require students to demonstrate conceptual understanding, for example, by providing students with a numerical expression and requiring students to produce or recognize an equivalent expression.</td>
<td>Integers can be divided, provided that the divisor is not zero.</td>
<td>How are the operations applied in real-world contexts?</td>
<td>Decimal Expansions of Fractions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If $p$ and $q$ are integers, then $(p/q) = (-p)/q = p/(-q)$.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td><strong>Students are able to:</strong></td>
<td>Use long division to convert a rational number to a decimal.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**SPED Strategies:**

- Review properties (i.e. communicative, associative, distributive, identity etc.).

- Utilize color counters.

- Review and chart rules for multiplying signed numbers.

- Describe real-world contexts with usage of adding and subtracting positive and negative integers.

- Provide mental imagery for mathematical idea (i.e. bank account ledger).

- Create and provide a list of properties of operations as strategies to multiply and divide rational numbers.

- Create a rational number conversion chart for decimals using long division; know that the decimal form of a rational number terminates in 0’s or eventually repeats.

- Review multiplication and division of rational numbers as an extension of multiplication and division of integers.

- Provide or create a multiplication chart.

- Create visual, verbal or tactile cues or reminders.

---

**How do the properties of operations help us compute with rational numbers?**

- What is the relationship between multiplication and division?
Present information through different modalities.

**Instructional Resources: UDL - Visual and Auditory Learner(s).**
*Operation Properties Commutative Property 7.NS.A.1d and 7.NS.A.2c*  
https://youtu.be/5RZwBqvMVMI

**ELL Strategies:**
Initiate discussions and provide opportunities for collaboration.

Highlight mathematical relationships; utilize various colors to show distinctions.

Provide multiplication and division chart to 100.

Teacher partially completes the equation and labels essential terms.

Interactive tools that can be used in many ways to build language as well as math skills.

Use whiteboards for students to write the equations dictated by the teacher.

Utilize pictures and photographs to show ELLs examples of class vocabulary and concepts.
Demonstrate and explain to a peer or small group how to multiply and divide signed numbers.

**New Jersey Student Learning Standards:**

7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

  7.NS.A.2c: Apply properties of operations as strategies to multiply and divide rational numbers.

7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

**Student Learning Objective 5:** Apply properties of operations as strategies to add, subtract, multiply, and divide rational numbers.

**Modified Student Learning Objectives/Standards:**

M.EE.7.NS.A.3: Compare quantities represented as decimals in real-world examples to tenths.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 1</td>
<td>7.NS.A.2c</td>
<td>The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers.</td>
<td>What models and relationships help you make sense of multiplying and dividing positive and negative numbers?</td>
<td>IFL Task(s) – Set of Related Lessons named “Adding and Subtracting Positive and Negative Rational Numbers” (7.NS.A.2 is not addressed in IFL unit)</td>
</tr>
<tr>
<td>MP 2</td>
<td>Tasks do not have a context.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MP 4</td>
<td>Tasks are not limited to integers.</td>
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<tr>
<td>MP 5</td>
<td>Tasks may involve products and quotients of 2 or 3 rational numbers.</td>
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</tr>
<tr>
<td>MP 6</td>
<td>Tasks require students to compute a product or quotient, or demonstrate conceptual understanding, for example, by producing or recognizing an expression equivalent to a</td>
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</tr>
<tr>
<td>MP 7</td>
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</tbody>
</table>
For example, given the expression \((-8)(6)/( -3)\), the student might be asked to recognize or produce the equivalent expression \(-8/3)( -6)\).

7.NS.A.3

- Tasks are one-step word problems.
- Tasks sample equally between addition/subtraction and multiplication/division.
- Tasks involve at least one negative number.

Solve real world problems involving the four operations with rational numbers.

**SPED Strategies:**

- Review properties (i.e. communicative, associative, distributive, identity etc.).
- Utilize color counters.

- Review and chart rules for multiplying signed numbers.

- Describe real-world contexts with usage of adding and subtracting (Positive and negative).

- Provide mental imagery for mathematical idea (i.e. bank account ledger).

- Create and provide a list of properties of operations as strategies to multiply and divide rational numbers.

- Create a chart modeling how to convert rational numbers to decimals using long division; know that the decimal form of a rational number terminates in 0’s or eventually repeats.

- Review multiplication and division of integers as an extension of multiplication and division of whole numbers.

- Many real world situations can be modeled and solved using operations with positive and negative rational numbers.

<table>
<thead>
<tr>
<th><strong>PBA(s):</strong></th>
<th><strong>Weights of Candies</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High and Low Elevations</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Additional Tasks/Activities:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Adding and Subtracting Rational Numbers (SLO 5 &amp; SLO 6)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Iced Tea Stand (SLO 5 &amp; SLO 6)</strong></td>
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<tr>
<td><strong>Multiplication and Division of Rational Numbers (SLO 5 &amp; SLO 6)</strong></td>
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<tr>
<td><strong>Operations with Rational Numbers (SLO 5 &amp; SLO 6)</strong></td>
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<tr>
<td><strong>Sharing Prize Money (SLO 5 &amp; SLO 6)</strong></td>
<td></td>
</tr>
<tr>
<td>Instructional Resources: UDL - Visual and Auditory Learner(s).</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>
| *Operation Properties Commutative Property*
| *7.NS.A.1d and 7.NS.A.2c* |
| [https://youtu.be/5RZwBqvMVM1](https://youtu.be/5RZwBqvMVM1) |

**ELL Strategies:**

Provide text to speech for math word problems.

Use of translation dictionary or software for vocabulary.

Implement strategy groups, group high-level with low-level students.

**Using Positive and Negative Numbers in Context** (SLO 5 & SLO 6)
Allow arranged groups to confer frequently with each other and share feedback.

Provide graphic organizers with different representations of mathematical solutions.

Have students create note cards or math journals with key words and visual examples.

**New Jersey Student Learning Standards:**
7.NS.A.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

7.NS.A.2c. Apply properties of operations as strategies to multiply and divide rational numbers.

7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.

**Student Learning Objective 6:** Solve mathematical and real-world problems involving addition, subtraction, multiplication, and division of signed rational numbers.

**Modified Student Learning Objectives/Standards:**
M.EE.7.NS.A.3: Compare quantities represented as decimals in real-world examples to tenths.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/Clarifications</th>
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<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 1</td>
<td>7.NS.A.2c</td>
<td>The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers.</td>
<td>What models and relationships help you make sense of multiplying and dividing positive and negative numbers? Understand that multiplication and division of whole numbers is extended to integers by</td>
<td>IFL Task(s) – Set of Related Lessons named “Adding and Subtracting Positive and Negative Rational Numbers”</td>
</tr>
<tr>
<td>MP 2</td>
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<tr>
<td>MP 4</td>
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<tr>
<td>MP 5</td>
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<tr>
<td>MP 6</td>
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</tr>
<tr>
<td>MP 7</td>
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</tr>
</tbody>
</table>
- Tasks may involve products and quotients of 2 or 3 rational numbers.
- Tasks require students to compute a product or quotient, or demonstrate conceptual understanding, for example, by producing or recognizing an expression equivalent to a given expression. For example, given the expression \((-8)(6)/(-3)\), the student might be asked to recognize or produce the equivalent expression \((-8/3)(-6)\).

7.NS.A.3

- Tasks are one-step word problems.
- Tasks sample equally between addition/subtraction and multiplication/division.
- Tasks involve at least one negative number.

<table>
<thead>
<tr>
<th>Multiply and divide rational numbers using the properties of operations.</th>
<th>Require that operations continue to satisfy properties of operations. What patterns are present when adding and subtracting integers?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply the convention of order of operations to add, subtract, multiply and divide rational numbers.</td>
<td>Many real world situations can be modeled and solved using operations with positive and negative rational numbers.</td>
</tr>
<tr>
<td>Solve real world problems involving the four operations with rational numbers.</td>
<td>SPED Strategies:</td>
</tr>
<tr>
<td>Review properties (i.e. communicative, associative, distributive, identity etc.).</td>
<td>Review properties (i.e. communicative, associative, distributive, identity etc.).</td>
</tr>
<tr>
<td>Utilize color counters.</td>
<td>Utilize color counters.</td>
</tr>
<tr>
<td>Review and chart rules for multiplying signed numbers.</td>
<td>Review and chart rules for multiplying signed numbers.</td>
</tr>
<tr>
<td>Describe real-world contexts with usage of adding and subtracting (Positive and negative).</td>
<td>Describe real-world contexts with usage of adding and subtracting (Positive and negative).</td>
</tr>
<tr>
<td>Provide mental imagery for mathematical idea (i.e. bank account ledger).</td>
<td>Provide mental imagery for mathematical idea (i.e. bank account ledger).</td>
</tr>
<tr>
<td>Create and provide a list of properties of operations as strategies to multiply and divide rational numbers.</td>
<td>Create and provide a list of properties of operations as strategies to multiply and divide rational numbers.</td>
</tr>
<tr>
<td>Create a convert a rational number charts for decimals using long division; know that the decimal form of a rational number terminates in 0’s or eventually repeats.</td>
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</tr>
</tbody>
</table>

(7.NS.A.2 is not addressed in IFL unit)

PBA(s):
- Weights of Candies
- High and Low Elevations

Additional Tasks/Activities:
- Adding and Subtracting Rational Numbers (SLO 5 & SLO 6)
- Iced Tea Stand (SLO 5 & SLO 6)
- Multiplication and Division of Rational Numbers (SLO 5 & SLO 6)
- Operations with Rational Numbers (SLO 5 & SLO 6)
- Sharing Prize Money (SLO 5 & SLO 6)
<table>
<thead>
<tr>
<th>Review multiplication and division of integers as an extension of multiplication and division of whole numbers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide or create a multiplication chart or charts.</td>
</tr>
<tr>
<td>Create visual, verbal or tactile cues or reminders.</td>
</tr>
<tr>
<td>Present information through different modalities.</td>
</tr>
<tr>
<td>Adjust color of text, graphs and visual content.</td>
</tr>
<tr>
<td>Include written descriptions for graphics, images and videos.</td>
</tr>
</tbody>
</table>
| **Instructional Resources: UDL - Visual and Auditory Learner(s).**  
*Operation Properties Commutative Property 7.NS.A.1d and 7.NS.A.2c  
https://youtu.be/5RZwBqvMVM* |
| **ELL Strategies:**  
Provide text to speech for math word problems. |
| Use of translation dictionary or software for vocabulary. |
| Implement strategy groups, group high-level with low-level students. |
Allow arranged groups to confer frequently with each other and share feedback.

Provide graphic organizers with different representations of mathematical solutions.

Have students create note cards or math journals with key words and visual examples.

**New Jersey Student Learning Standard:**

7.EE.A.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

**Student Learning Objective 7:** Apply the properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

**Modified Student Learning Objectives/Standards:**

M.EE.7.EE.A.1: Use the properties of operations as strategies to demonstrate that expressions are equivalent.

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>7.EE.A.1</td>
<td>Rewriting an expression in different forms in a problem context can shed light on the problem.</td>
<td>What strategies can be used for understanding and representing real situations using algebraic expressions and equations?</td>
<td>Factor, Expand and Combine Like Terms</td>
</tr>
<tr>
<td>MP 7</td>
<td></td>
<td>Add and subtract linear expressions having rational coefficients, using properties of operations.</td>
<td>What properties are required in order to rewrite and evaluate algebraic expressions and solve equations?</td>
<td>Writing Expressions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factor and expand linear expressions having rational coefficients, using properties of operations.</td>
<td>How is the distributive property applied when rewriting and</td>
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<td></td>
<td>Translate word situations to algebraic</td>
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</tbody>
</table>
equivalent to both (such as $y(3+x) + yk$.

### 7.C.1.2
- Tasks should not require students to identify or name properties.

**SPED Strategies:**
Create and review writing an expression in different forms.

The context of a problem can shed light on how the quantities in it are related.

Create and review reading word problems (i.e. highlight important information in text).

Identify and review vocabulary in word problems.

Create and review equations from information given in a word problems.

Review prerequisite skills and concepts.

Include written descriptions for graphics, images and videos.

Present information through different modalities.

Adjust color of text, graphs and visual content.

**Instructional Resources: UDL - Visual and Auditory Learner(s).**

*Factor with variables 7.EE.A.2*

https://youtu.be/ZRfxVkw7CI
Rewriting Expressions in Different Forms - Common Core Standard
https://youtu.be/yDJ5Fn06OqA

ELL Strategies:
Outline and highlight key vocabulary words.

Provide partially completed solutions.

Peer coach students in different groups.

Word/picture wall with translations side by side.

L1 (students’ native language) text and/or Support should be used.

Present information utilizing pictures or illustrations of mathematical concepts.

Utilize graphics, diagrams and charts with written labels on parts.

Utilize technological programs which provide verbal and visual instruction in native and/or second language.

Website:
KHAN ACADEMY Expressions and Equations
https://www.khanacademy.org/commoncore/grade-7-EE
New Jersey Student Learning Standard:  
7.EE.A.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."

Student Learning Objective 8: Rewrite algebraic expressions in equivalent forms to highlight how the quantities in it are related.

Modified Student Learning Objectives/Standards:  
M.EE.7.EE.A.2: Identify an arithmetic sequence of whole numbers with a whole number common difference.

<table>
<thead>
<tr>
<th>MPs</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>7.EE.A.2</td>
<td>Understand the reason for rewriting an expression in terms of a contextual situation. For example, students understand that a 20% discount is the same as finding 80% of the cost, $c (0.80c)$. Create and review writing an expression in different forms. The context of a problem can shed light on how the quantities in it are related. Simplify expressions. Translate words to expressions.</td>
<td>How can we represent value using variables? What properties are required in order to rewrite and evaluate algebraic expressions and solve equations? How is the distributive property applied when rewriting and evaluating algebraic expressions?</td>
<td>Equivalent Expressions</td>
</tr>
<tr>
<td>MP 7</td>
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<td></td>
<td>Generating Equivalent Expressions</td>
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<td></td>
<td>Miles to Kilometers</td>
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<td></td>
<td>Ticket to Ride</td>
</tr>
</tbody>
</table>
Create and review reading word problems (i.e. highlight important information in text).

Identify and review vocabulary in word problems.

Create and review writing equations from information given in a word problem.

Review prerequisite skills and concepts.

Provide and review area model.

Include written descriptions for graphics, images and videos.

Present information through different modalities.

Adjust color of text, graphs and visual content.

**Instructional Resources: UDL - Visual and Auditory Learner(s).**

*Factor with variables 7.EE.A.2*

https://youtu.be/ZRfxVkw7CI

*Rewriting Expressions in Different Forms - Common Core Standard*

https://youtu.be/yDJ5Fn06OqA
**ELL Strategies:**

- Outline and highlight key vocabulary words.
- Provide partially completed solutions.
- Peer coach students in different groups.
- Word/picture wall with translations side by side.
- L1 (Student’s native language) text and/or support should be used.
- Present information utilizing pictures or illustrations of mathematical concepts.
- Utilize graphics, diagrams and charts with written labels on parts.
- Utilize technological programs which provide verbal and visual instruction in native and/or second language.

**Website:**

**KHAN ACADEMY** Expressions and Equations

https://www.khanacademy.org/commoncore/grade-7-EE
Integrated Evidence Statements

7.C.1.1: Base explanations/reasoning on the properties of operations.
- Tasks should not require students to identify or name properties

7.C.2: Base explanations/reasoning on the relationship between addition and subtraction or the relationship between multiplication and division.

7.C.3: Base explanations/reasoning on a number line diagram (whether provided in the prompt or constructed by the student in her response).

7.C.7.2: Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as $1 + 4 = 5 + 7 = 12$, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions.
- Tasks focus on demonstrating understanding that a number is rational.
- Tasks do not directly assess the ability to divide two whole numbers.

7.C.8: Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.
- Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to Grade 7.

7.D.1: Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 7, requiring application of knowledge and skills articulated in Type I, Sub-Claim A Evidence Statements.
- Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7.

7.D.2: Solve multi-step contextual problems with degree of difficulty appropriate to grade 7, requiring application of knowledge and skills articulated in 6.RP.A, 6.EE.C, 6.G.
- Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7.

7.D.3: Micro-models: Autonomously apply a technique from pure mathematics to a real-world situation in which the technique yields valuable results even though it is obviously not applicable in a strict mathematical sense (e.g., profitably applying proportional relationships to a phenomenon that is obviously nonlinear or statistical in nature).
- Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7.
7.D.4 - Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity.

- Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7.
<table>
<thead>
<tr>
<th>Unit 1 Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Absolute Value</td>
</tr>
<tr>
<td>• Additive Inverse</td>
</tr>
<tr>
<td>• Cardinal Numbers</td>
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<tr>
<td>• Composite</td>
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<tr>
<td>• Factorization</td>
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<tr>
<td>• Horizontal</td>
</tr>
<tr>
<td>• Integers</td>
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<tr>
<td>• Inverse Operation</td>
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<tr>
<td>• Linear Equation</td>
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<tr>
<td>• Long Division</td>
</tr>
<tr>
<td>• Multiplication Inverse</td>
</tr>
<tr>
<td>• Natural Numbers</td>
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<tr>
<td>• Negative Numbers</td>
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<tr>
<td>• Opposite Numbers</td>
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<tr>
<td>• Ordinal Number</td>
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<tr>
<td>• Positive Numbers</td>
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<tr>
<td>• Prime</td>
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<tr>
<td>• Rational Numbers</td>
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<tr>
<td>• Remainder</td>
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<tr>
<td>• Repeating Decimal</td>
</tr>
<tr>
<td>• Terminating Decimal</td>
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<tr>
<td>• Vertical</td>
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<tr>
<td>• Zero Pair</td>
</tr>
<tr>
<td>References &amp; Suggested Instructional Websites</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><a href="http://www.internet4classrooms.com">www.internet4classrooms.com</a></td>
</tr>
<tr>
<td><a href="http://www.illustrativemathematics.org/">www.illustrativemathematics.org/</a></td>
</tr>
<tr>
<td><a href="http://www.katm.org/flipbooks/7%20FlipBook%20Final%20CCSS%202014.pdf">http://www.katm.org/flipbooks/7%20FlipBook%20Final%20CCSS%202014.pdf</a></td>
</tr>
<tr>
<td><a href="https://www.georgiastandards.org/Common-Core/Pages/Math-6-8.aspx">https://www.georgiastandards.org/Common-Core/Pages/Math-6-8.aspx</a></td>
</tr>
<tr>
<td><a href="https://learnzillion.com/">https://learnzillion.com/</a></td>
</tr>
<tr>
<td><a href="http://www.insidemathematics.org/">http://www.insidemathematics.org/</a></td>
</tr>
<tr>
<td><a href="https://www.engageny.org/">https://www.engageny.org/</a></td>
</tr>
</tbody>
</table>
Field Trip Ideas

**Buehler Challenger & Science Center** – [http://www.bcsc.org/5-9th-grade/](http://www.bcsc.org/5-9th-grade/)

- Participants work as a team as they take on the role of astronauts and mission controllers to *Rendezvous with Comet Halley*, *Return to the Moon*, or *Voyage to Mars*. Students use team-building and hands-on learning with a focus on STEM to complete their mission goal.

**LIBERTY SCIENCE CENTER** (Jersey City, NJ) – [http://lsc.org/plan-your-visit/](http://lsc.org/plan-your-visit/)

- An interactive science museum and learning center with math connections. There is a math guidebook for teachers to make connections with math.


- For more than 20 years, educators from around the country have been bringing students to the Museum to help them understand how finance impacts their daily lives. The Museum offers discounted admission for pre-booked groups of eight or more, as well as a variety of classes for students in middle school through college.


- Mathematics illuminates the patterns and structures all around us. Our dynamic exhibits, gallery, and programs will stimulate inquiry, spark curiosity, and reveal the wonders of mathematics. MoMath has innovative exhibits that will engage folks from 105 to 5 years old (and sometimes younger), but with a special emphasis on activities for 4th through 8th graders.