MATHEMATICS

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 conceptual-based 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.
**ESL Framework**

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</td>
<td>7.NS.A.3</td>
<td></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.2e</td>
<td>7.NS.A.3</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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</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 stagnate 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)

**Conceptual-Based Model**

The purpose of the Conceptual-Based Model is to allow students the time to explore mathematical concepts to promote academic rigor and high level of student discourse to concurrently develop conceptual understanding, procedural fluency, and problem-solving skills. During the 90 minute block of mathematics instruction, teachers will select and set up a mathematical task that targets the mathematical goal(s) for the lesson. The teacher sets the stage for learning by ensuring the objective/rationale of the lesson is well-defined and connected to the task. The task should build on student’s prior knowledge, life experiences, and culture allowing students to share their prior knowledge and life/cultural experiences as it relates to the task to ensure that students understand the context of the problem. The instructional goal is to introduce the activity/task to the students allowing them to have access to learning while maintaining the cognitive demands of the task. Teachers will then support the students’ exploration of the task; this can be done independently, in pairs or in small groups or a combination of all. It is highly recommended that students be given the opportunity to privately work on a task to generate solutions on their own. Students are encouraged to share their findings with their peers in small group to compare their solutions. As students are actively engaged in constructing meaning of the mathematical concept(s) being taught and communicating their understanding of the concept(s) with their peers, the teacher monitors the development of student understanding by observing student thinking and using questions to stimulate thinking to drive students toward the aimed mathematical goal(s). The teacher assesses students’ understanding of key mathematical ideas, problem-solving strategies, and the use of and connection between models and representations to determine what the student knows. The teacher advances the students’ understanding to move the student beyond their present thinking and expand what they know to an additional situation. Teachers have been trained to strategically select groups of students who have different solution paths to the same task, different representations and errors/misconceptions to share, discuss, and analyze as a whole group. By providing these instructional opportunities, the teacher will then be able to orchestrate the class discussion by providing students with the opportunities to make their learning public as students share, discuss, analyze, clarify, extend, connect, strengthen, and record their thinking strategies. After students discuss, justify, and challenge the various solution paths that were shared, a summary of the learning is articulated and connected to the objective of the lesson. Students should be given an opportunity to close the lesson with a reflection on their learning.
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<th>Effective Pedagogical Routines/Instructional Strategies</th>
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<td>Connect Previous Knowledge to New Learning</td>
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<td>Making Thinking Visible</td>
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<td>Develop and Demonstrate Mathematical Practices</td>
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<td>Inquiry-Oriented and Exploratory Approach</td>
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<td>Multiple Solution Paths and Strategies</td>
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<td>Use of Multiple Representations</td>
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<td>Explain the Rationale of your Math Work</td>
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<td>Quick Writes</td>
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<td>Pair/Trio Sharing</td>
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<td>Turn and Talk</td>
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<td>Charting</td>
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<td>Gallery Walks</td>
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<td>Small Group and Whole Class Discussions</td>
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<td>Student Modeling</td>
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<td><strong>Analyze Student Work</strong></td>
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<td>Identify Student’s Mathematical Understanding</td>
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<td>Identify Student’s Mathematical Misunderstandings</td>
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<td>Interviews</td>
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<tr>
<td>Role Playing</td>
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<tr>
<td>Diagrams, Charts, Tables, and Graphs</td>
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<td>Anticipate Likely and Possible Student Responses</td>
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<td>Collect Different Student Approaches</td>
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<td>Multiple Response Strategies</td>
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<td>Asking Assessing and Advancing Questions</td>
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<td>Revoicing</td>
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<td>Recapping</td>
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<td>Challenging</td>
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<td>Pressing for Accuracy and Reasoning</td>
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<td>Maintain the Cognitive Demand</td>
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# 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.
    

  - 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.
    

- **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, Khan Academy 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.
    

- **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>Characteristics</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 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 |
## Differentiated Instruction

### Accommodate Based on Students Individual Needs: Strategies

<table>
<thead>
<tr>
<th>Time/General</th>
<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 conceptual model</td>
<td>Teacher-made checklist</td>
</tr>
<tr>
<td>Adjust length of assignment</td>
<td>Have students verbalize steps</td>
<td>Short manageable tasks</td>
<td>Use visual graphic organizers</td>
</tr>
<tr>
<td>Timeline with due dates for reports and projects</td>
<td>Repeat, clarify or reword directions</td>
<td>Brief and concrete directions</td>
<td>Reference resources to promote independence</td>
</tr>
<tr>
<td>Communication system between home and school</td>
<td>Mini-breaks between tasks</td>
<td>Provide immediate feedback</td>
<td>Visual and verbal reminders</td>
</tr>
<tr>
<td>Provide lecture notes/outline</td>
<td>Provide a warning for transitions</td>
<td>Small group instruction</td>
<td>Graphic organizers</td>
</tr>
<tr>
<td></td>
<td>Partnering</td>
<td>Emphasize multi-sensory learning</td>
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</tbody>
</table>

### Assistive Technology
- Computer/whiteboard
- Tape recorder
- Video Tape

### Tests/Quizzes/Grading
- Extended time
- Study guides
- Shortened tests
- Read directions aloud

### Behavior/Attention
- Consistent daily structured routine
- Simple and clear classroom rules
- Frequent feedback

### Organization
- Individual daily planner
- Display a written agenda
- Note-taking assistance
- Color code materials
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.
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 1 Assessment
   PARCC
   SGO Baseline

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 diagram.

- **7.NS.A.1a:** Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

- **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 \(-\text{p/q} = (-\text{p})/\text{q} = \text{p}/(-\text{q})\). 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

7.NS.A.3: 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.)

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

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."
Mathematical Practices

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.
### NJSLS:

7.NS.A.1a-d, 7.NS.A.2a-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 Standard(s):  

**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 diagram.

- **7.NS.A.1a**: Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*
- **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.

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<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
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<tbody>
<tr>
<td>MP 2</td>
<td>7.NS.A.1a-b</td>
<td>Opposite quantities combine to make 0 (additive inverses).</td>
<td>Addition and subtraction of rational numbers can be represented by movement on a number line.</td>
<td>IFL Task(s) – Set of Related Lessons named “Adding and...”</td>
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<tr>
<td>MP 3</td>
<td>Tasks do not have a context.</td>
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<td>MP 5</td>
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<tr>
<td><strong>MP 7</strong></td>
<td><strong>Tasks</strong></td>
<td><strong>Students are able to:</strong></td>
<td><strong>SPED Strategies:</strong></td>
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</table>
| • 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. | **p + q** is the number located a distance | **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.** | **Create examples of situations in which opposite quantities combine to make zero.**  
**Create and describe situations in which opposite quantities combine to make 0.** | **Create examples of situations in which opposite quantities combine to make zero.**  
**Create and describe situations in which opposite quantities combine to make 0.** |

**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:**

**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 NJSLS 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 and altitude, football and bank accounts.

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.

Create numbers throughout the learning environment (i.e. floor, desk, wall, construction paper etc.).

Present information through different modalities.

Use graph paper.

Adjust color of numbers, graphs and visual content.

Include written descriptions for graphics, images and videos.

**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.
Peer coaching with students in different groups.
Translated math glossary should be provided.
Math journal for students to note questions and concerns should be used.
Use of word/picture wall
L1 text and/or support should be provided.
Pictures/illustrations
Provide graphic organizers.
Develop graphic representations of number lines and show multiple examples.

**Website:**
**Teachers First Adapt a Strategy. Adjusting Lessons for ESL/ELL students**
http://www.teachersfirst.com/content/esl/adaptsтрат.cfm
New Jersey Student Learning Standard(s):
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 diagram.

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.

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<th>MPs</th>
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<tbody>
<tr>
<td>MP 2</td>
<td>7.NS.A.1c-d</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></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></td>
<td>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.</td>
<td>IFL PBA Task(s):</td>
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<tr>
<td>MP 7</td>
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<td>Students are able to:</td>
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<td></td>
<td>• Represent addition and subtraction on a horizontal number line.</td>
<td>Weights of Candies</td>
<td></td>
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<td></td>
<td></td>
<td>• Represent addition and subtraction on a</td>
<td>High and Low Elevations</td>
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Skills, Strategies & Concepts

- Opposite quantities combine to make 0 (additive inverses).
- \( p + q \) is the number located a distance \(|q|\) from \( p \), in 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
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 $-1/3 + -(1/5 + 5/8)$.

- 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 $-(8.1 - 7.4)$

<table>
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<tr>
<th>vertical number line.</th>
<th>demonstrate that the distance between two rational numbers on the number line is the absolute value of their difference.</th>
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<tr>
<td>interpret sums of rational numbers in real-world situations.</td>
<td>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 NJSLS is to build on student understanding of number lines developed in 6th grade.</td>
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<td>show that the distance between two rational numbers on the number line is the absolute value of their difference.</td>
<td><strong>SPED Strategies:</strong> Create examples of situations in which opposite quantities combine to make zero.</td>
</tr>
<tr>
<td>create and describe situations in which opposite quantities combine to make 0.</td>
<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, altitude, football and bank accounts.</td>
<td>demonstrate that 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.</td>
</tr>
<tr>
<td>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.</td>
<td>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 the number line as $b + a$, while $a-b$ and $b-a$ model movement in opposite directions on the number line.</td>
</tr>
</tbody>
</table>

**Additional Tasks/Activities:**
- The Distance Between Two Rational Numbers
- Differences of Integers
- Hot Air Balloons
- Sign Your Name
| Create numbers throughout the learning environment (i.e. floor, desk, wall, construction paper etc.). | Number line. How do the properties of operation help us compute with rational numbers? |
| Present information through different modalities. | How do we use a number line to show addition and subtraction of rational numbers? |
| 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/1T8a8Ah8-s](https://youtu.be/1T8a8Ah8-s)
- 7.NS.1-3 - Adding and Subtracting Fractions
  - [https://youtu.be/mcQGg-kDLyw](https://youtu.be/mcQGg-kDLyw)

**ELL Strategies:**

Utilize thermometer manipulatives

Create actual number line utilizing resources
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 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 Standard(s):
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.

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

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<tbody>
<tr>
<td>MP 2</td>
<td>7.NS.A.2a-c</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>Division of Integers</td>
</tr>
<tr>
<td>MP 4</td>
<td>7.NS.A.2a-c</td>
<td>Decimal form of a rational number terminates in 0s 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</td>
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<tr>
<td>MP 7</td>
<td>7.NS.A.2a-c</td>
<td>Integers can be divided, provided that the divisor is not zero.</td>
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<td>If ( p ) and ( q ) are integers, then (-\frac{p}{q} = \frac{-p}{q} = \frac{p}{-q}).</td>
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Tasks/Activities:
- Division of Integers
- The Green Fundraiser
- Multiplying Rational Numbers
- Patterns of Multiplication and Division
| 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 the given expression is equivalent to \((-3)(6 + -4) + (-3)(-3)\). | \(p/(-q)\). **Students are able to:**  
- Multiply and divide signed numbers. **SPED Strategies:**  
Review properties (i.e. communicative, associative, distributive, identity etc.). 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 integers as an extension of multiplication and division of whole numbers. Provide or create a multiplication chart. | operations.  
What is the result of adding a number and its inverse or multiplying a number and its inverse?  
How are the operations applied in real-world contexts?  
How do the properties of operations help us compute with rational numbers?  
What is the relationship between multiplication and division? |
| 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.  
The 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 Standard(s):  
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.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.

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</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>7.NS.A.2</td>
<td>Every quotient of integers (with non-zero divisor) is a rational number. Decimal form of a rational number terminates in 0s or eventually repeats. Integers can be divided, provided that the divisor is not zero. If ( p ) and ( q ) are integers, then ( (p/q) = (-p)/(-q) ). Students are able to: Use long division to convert a rational number to a decimal. <strong>SPED Strategies:</strong> Review properties (i.e. communicative, associative, distributive, identity etc.).</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 requiring that operations continue to satisfy properties of operations. How are the operations applied in real-world contexts? How do the properties of operations help us compute with rational numbers? What is the relationship between</td>
<td>Converting Rational Numbers to Decimals Using Long Division Decimal Expansions of Fractions</td>
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<tr>
<td>MP 4</td>
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<td>MP 7</td>
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<tr>
<td>Utilize color counters.</td>
<td>Review and chart rules for multiplying signed numbers.</td>
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<tr>
<td>Describe real-world contexts with usage of adding and subtracting positive and negative integers.</td>
<td>Provide mental imagery for mathematical idea (i.e. bank account ledger).</td>
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<tr>
<td>Create and provide a list of properties of operations as strategies to multiply and divide rational numbers.</td>
<td>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.</td>
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<tr>
<td>Review multiplication and division of integers as an extension of multiplication and division of whole numbers.</td>
<td>Provide or create a multiplication chart or charts.</td>
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<tr>
<td>Create visual, verbal or tactile cues or reminders.</td>
<td>Present information through different modalities.</td>
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| Instructional Resources (UDL - Visual and Auditory Learner(s)):
Operation Properties Commutative Property 7.NS.A.1d and 7.NS.A.2c
https://youtu.be/5RZwBqvMVMl |
|--------------------------------|
| **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 Standard(s):
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.

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>MP 1</td>
<td>7.NS.A.2-3</td>
<td>The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers. Add and subtract rational numbers. Multiply and divide rational numbers using the properties of operations. Apply the convention of order of operations to add, subtract, multiply and divide rational numbers. Solve real world problems involving the four operations with rational numbers. <strong>SPED Strategies:</strong> Review properties (i.e. communicative, associative, distributive, identity etc.).</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 requiring that operations continue to satisfy properties of operations. What patterns are present when adding and subtracting integers? Many real world situations can be modeled and solved using operations with positive and negative rational 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>
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<tr>
<td>MP 2</td>
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<td>MP 4</td>
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<td>MP 6</td>
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<td>MP 7</td>
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PBA(s): Weights of Candies High and Low
expression $-(8/3)(-6)$.

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

<table>
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<tr>
<th>Utilize color counters.</th>
<th>Review and chart rules for multiplying signed numbers.</th>
</tr>
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<tbody>
<tr>
<td>Describe real-world contexts with usage of adding and subtracting (Positive and negative).</td>
<td>Provide mental imagery for mathematical idea (i.e. bank account ledger).</td>
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<td>Create and provide a list of properties of operations as strategies to multiply and divide rational numbers.</td>
<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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<td>Review multiplication and division of integers as an extension of multiplication and division of whole numbers.</td>
<td>Provide or create a multiplication chart or charts</td>
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<td>Create visual, verbal or tactile cues or</td>
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**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)
- Using Positive and Negative Numbers in Context (SLO 5 & SLO 6)
reminders.

Present information through different modalities.

Adjust color of text, graphs and visual content.
Visuals and anchor charts.

Include written descriptions for graphics, images and videos.

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

Operation Properties Commutative Property 7.NS.A.1d and 7.NS.A.2c
[https://youtu.be/5RZwBqvMVMl](https://youtu.be/5RZwBqvMVMl)

**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(s):
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.

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<td>The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers. Add and subtract rational numbers. Multiply and divide rational numbers using</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</td>
<td>IFL Task(s) – Set of Related Lessons named “Adding and Subtracting Positive and Negative Rational Numbers”</td>
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<tr>
<td>MP 2</td>
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<td>MP 4</td>
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<td>MP 5</td>
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<td>MP 6</td>
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<tr>
<td>MP 7</td>
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</table>
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 \((-8/3)(-6)\).

- Tasks are one-step word problems.

- Tasks sample equally between addition/subtraction and multiplication/division.

- Tasks involve at least one negative number.

the properties of operations.

- Apply the convention of order of operations to add, subtract, multiply and divide rational numbers.

- 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 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.

extended to integers by requiring that operations continue to satisfy properties of operations. What patterns are present when adding and subtracting integers?

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

(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>
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<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/5RZwBqvMvMI

**ELL Strategies:**

Provide text to speech for math word problems.

Use of translation dictionary or software for vocabulary.

| Using Positive and Negative Numbers in Context (SLO 5 & SLO 6) |
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(s):**
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>
<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 2</td>
<td>7.EE.A.1 7.C.1.2</td>
<td>Rewriting an expression in different forms in a problem context can shed light on the problem. Add and subtract linear expressions having rational coefficients, using properties of operations. Factor and expand linear expressions having rational coefficients, using properties of</td>
<td>What strategies can be used for understanding and representing real situations using algebraic expressions and equations? What properties are required in order to rewrite and evaluate algebraic expressions and solve equations?</td>
<td>Factor, Expand and Combine Like Terms Writing Expressions</td>
</tr>
</tbody>
</table>

- Tasks are not limited to integer coefficients.
- Tasks may involve issues of strategy, e.g., by providing a factored expression such as
<table>
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<tr>
<th>$y(3+x+k)$ and a fully expanded expression $3y + xy + ky$, and requiring students to produce or identify a new expression equivalent to both (such as $y(3+x) + yk$.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base explanations/reasoning on the properties of operations.</td>
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<tr>
<td>Tasks should not require students to identify or name properties.</td>
</tr>
<tr>
<td>operations.</td>
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<tr>
<td>Translate word situations to algebraic expressions.</td>
</tr>
</tbody>
</table>

**SPED Strategies:**
Create and review writing an expression in different forms in a problem context can shed light on the problem of 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.

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.

How is the distributive property applied when rewriting and evaluating algebraic expressions?
<table>
<thead>
<tr>
<th>Instructional Resources (UDL - Visual and Auditory Learner(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor with variables 7.EE.A.2</td>
</tr>
<tr>
<td>[7.EE.2-1.0] Rewriting Expressions in Different Forms - Common Core Standard</td>
</tr>
</tbody>
</table>

**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 text and/or support should be provided.
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.
New Jersey Student Learning Standard(s):
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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<th>Tasks/Activities</th>
</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) (0.80(c)). Write expressions in equivalent forms to shed light on the problem and interpret the relationship between the quantities in the context of the problem. 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 Generating Equivalent Expressions Miles to Kilometers Ticket to Ride</td>
</tr>
<tr>
<td>MP 7</td>
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SPED Strategies:
Create and review writing an expression in different forms in a problem context can shed light on the problem of 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 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
[7.EE.2-1.0] Rewriting Expressions in

https://youtu.be/ZRfxVkqw7CI
### Different Forms - Common Core Standard

[https://youtu.be/yDJ5Fn06OqA](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.

Provide L1 text and/or support.

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](https://www.khanacademy.org/commoncore/grade-7-EE)
## Integrated Evidence Statements

<table>
<thead>
<tr>
<th>7.C.1.1:</th>
<th>Base explanations/reasoning on the properties of operations.</th>
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<tbody>
<tr>
<td></td>
<td>• Tasks should not require students to identify or name properties</td>
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</table>

| 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.
# Unit 1 Vocabulary

<table>
<thead>
<tr>
<th>Absolute Value</th>
<th>Negative Numbers</th>
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<tbody>
<tr>
<td>Additive Inverse</td>
<td>Opposite Numbers</td>
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<tr>
<td>Cardinal Numbers</td>
<td>Ordinal Number</td>
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<tr>
<td>Composite</td>
<td>Positive Numbers</td>
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<td>Factorization</td>
<td>Prime</td>
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<td>Horizontal</td>
<td>Rational Numbers</td>
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<tr>
<td>Integers</td>
<td>Remainder</td>
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<tr>
<td>Inverse Operation</td>
<td>Repeating Decimal</td>
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<td>Linear Equation</td>
<td>Terminating Decimal</td>
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<td>Long Division</td>
<td>Vertical</td>
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<td>Multiplication Inverse</td>
<td>Zero Pair</td>
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<tr>
<td>Natural Numbers</td>
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<tr>
<td>References &amp; Suggested Instructional Websites</td>
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<td><a href="http://www.internet4classrooms.com">www.internet4classrooms.com</a></td>
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<td><a href="http://www.illustrativemathematics.org/">www.illustrativemathematics.org/</a></td>
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<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>
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<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>
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<td><a href="https://learnzillion.com/">https://learnzillion.com/</a></td>
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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.


Fiery Hazards @ Liberty Science Center

- Classify and model different types of volcanoes. Study a series of eruptions and construct an explanation of how lava flows have changed Earth’s surface at varying times and spatial scales.


- 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.