Grade 4: Unit 3
Building Fractions & Decimal Notation
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.

Fourth grade Mathematics consists of the following domains: Operations and Algebraic Thinking (OA), Number and Operations in Base Ten (NBT), Number and Operations-Fractions (NF), Measurement and Data (MD), and Geometry (G). In fourth grade, instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

1) Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, and area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

2) Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

3) Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.
**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](http://www.state.nj.us/education/modelcurriculum/ela/ELLOverview.pdf)
<table>
<thead>
<tr>
<th>#</th>
<th>Student Learning Objective</th>
<th>CCSS</th>
<th>Instruction: 8 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make a line plot to display a data set in measurements in fractions of a unit (1/2, 1/4, 1/8) and use it to solve problems involving addition and subtraction of fractions with like denominators.</td>
<td>4.MD.B.4</td>
<td>Assessment: 1 week</td>
</tr>
<tr>
<td>2</td>
<td>Multiply a fraction by a whole number using visual fraction models and equations, demonstrating a fraction a/b as a multiple of 1/b.</td>
<td>4.NF.B.4a,4b</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Multiply a fraction by a whole number, using a visual fraction model and equations to demonstrate that a multiple of a/b is the product of 1/b and a whole number.</td>
<td>4.NF.B.4a,4b</td>
<td></td>
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<tr>
<td>4</td>
<td>Solve 1-step word problems involving multiplication of a fraction by a whole number, using visual fraction models and equations to represent the problem</td>
<td>4.NF.B.4c</td>
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</tr>
<tr>
<td>5</td>
<td>Add two fractions with respective denominators of 10 and 100 by writing each fraction with denominator 100.</td>
<td>4.NF.C.5</td>
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<tr>
<td>6</td>
<td>Given decimal notation, write fractions having denominators of 10 or 100.</td>
<td>4.NF.C.6</td>
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<tr>
<td>7</td>
<td>Compare two decimels to hundreths by reasoning about their size, demonstrating that comparisons are valid only when the two decimals refer to the same whole; record the results of comparisons with the symbols &gt;, =, or &lt;, and justify the conclusions, e.g., by using a visual model.</td>
<td>4.NF.C.7</td>
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<tr>
<td>8</td>
<td>Solve word problems involving simple fractions or decimals that incorporate measurement comparisons of like units (including problems that require measurements given in a larger unit in terms of a smaller unit).</td>
<td>4.MD.A.2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fluently add and subtract multi-digit whole numbers using the standard algorithm.</td>
<td>4.NBT.B.4*</td>
<td></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)**

**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)

Teacher and students practice mathematics processes together through interactive activities, problem solving, and discussion. (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)
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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>Small Group and Whole Class Discussions</td>
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<td>Analyze Student Work</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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<td>Role Playing</td>
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<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>Asking Assessing and Advancing Questions</td>
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<td>Challenging</td>
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<tr>
<td>Pressing for Accuracy and Reasoning</td>
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<tr>
<td>Maintain the Cognitive Demand</td>
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# Educational Technology

## Standards

8.1.5.A.1, 8.1.5.A.2, 8.1.5.A.3, 8.1.5.D.3

- Technology Operations and Concepts
  - Select and use the appropriate digital tools and resources to accomplish a variety of tasks including problem solving.

  **Example:** Online games can assist with the learning of skills and provide practice to students in a digital form, such as the conversion of decimals to fractions. [http://www.sheppardsoftware.com/mathgames/fractions/FractionsToDecimals.htm](http://www.sheppardsoftware.com/mathgames/fractions/FractionsToDecimals.htm)

  - Format a document using a word processing application to enhance text and include graphics, symbols, and/or pictures.

  **Example:** Tables can be created on the computer to show students the conversion of like units including measurements given in a larger unit and needed in a smaller unit as a reference sheet or to show patterns, such as 12 inches in 1 foot.

  - Use graphic organizer to organize information about problem or issue.

  **Example:** Graphic organizers can be used to assist students in dissecting information provided when they are solving word problems. [http://www.triumphlearning.com/articles/MPS_Resources/MPS_GraphicOrganizers.pdf](http://www.triumphlearning.com/articles/MPS_Resources/MPS_GraphicOrganizers.pdf)

- Digital Citizenship

  - Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.

  **Example:** A cyber safety chart will be posted by the computer center in the classroom so students are reminded of proper behavior when they are using the computers to complete assignments on programs such as Successmaker and Imagine Math Facts. [http://www.k12.wa.us/safetycenter/InternetSafety/pubdocs/InternetSafety.pdf](http://www.k12.wa.us/safetycenter/InternetSafety/pubdocs/InternetSafety.pdf) or [https://www.nacs.k12.in.us/cms/lib/IN01906695/Centricity/Domain/604/Internet%20Safety%20Tips%20for%20Students.pdf](https://www.nacs.k12.in.us/cms/lib/IN01906695/Centricity/Domain/604/Internet%20Safety%20Tips%20for%20Students.pdf)
## 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 and use tools to explore and deepen understanding of concepts. Number lines can be used as tools to create line plots that display fractions of a unit and calculators can be used to verify responses when students are adding and subtracting whole numbers using the standard algorithm.

- **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 communicate precisely using clear definitions and provide carefully formulated explanations when constructing arguments. Students will communicate and defend mathematical reasoning using objects, drawings, diagrams, and/or actions. Students will ask probing questions to clarify or improve arguments. In this unit, visual fraction models and equations are used when multiplying a fraction by a whole number and visual models to compare the values of decimals.

- **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: Students will understand the meaning of a problem and look for entry points to its solution. They will analyze information, make conjectures, and plan a solution pathway. Students will monitor and evaluate progress and change course as necessary. In this unit, students will monitor their creation of decimal visual models to make adjustments based on the reasonableness of the values represented and compare to fractions with denominators of 10 or 100.

- **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 collaboratively in groups to solve mathematical tasks. Students will listen to or read the arguments of others and ask probing questions to clarify and improve arguments. In this unit, students will justify the comparison of decimals by creating visual models that represent the values being compared and referring to the same whole.
## WIDA Proficiency Levels

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

| 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 meaning 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

## Sensory Supports*

- Real-life objects (realia) or concrete objects
- Physical models
- Manipulatives
- Pictures & photographs
- Visual representations or models such as diagrams or drawings
- Videos & films
- Newspapers or magazines
- Gestures
- Physical movements
- Music & songs

## Graphic Supports*

- Graphs
- Charts
- Timelines
- Number lines
- Graphic organizers
- Graphing paper

## Interactive Supports*

- In a whole group
- In a small group
- With a partner such as Turn-and-Talk
- In pairs as a group (first, two pairs work independently, then they form a group of four)
- In triads
- Cooperative learning structures such as Think-Pair-Share
- Interactive websites or software
- With a mentor or coach

## Verbal and Textual Supports

- Labeling
- Students’ native language
- Modeling
- Repetitions
- Paraphrasing
- Summarizing
- Guiding questions
- Clarifying questions
- Probing questions
- Leveled questions such as What? When? Where? How? Why?
- Questioning prompts & cues
- Word Banks
- Sentence starters
- Sentence frames
- Discussion frames
- Talk moves, including Wait Time

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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

- Present new concepts using student vocabulary. Use student diction to capture attention and build understanding before using academic terms.
  
  **Example:** Work with students to create a variety of vocabulary sorting and matching games that relate student diction to vocabulary words in this unit. Students can work in teams or individually to play these games for approximately 10-15 minutes each week.

- Learn About Your Students: Open communication should uncover students’ learning styles. Distribute surveys and questionnaires, and hold class discussions.
  
  **Example:** Have students survey the class or classes to collect data regarding various student interests. Students can then create a line plot to display and answer questions regarding the data.

- Everyone has a Voice: Create a classroom environment where students know that their contributions are expected and valued.
  
  **Example:** Norms for sharing are established that communicate a growth mindset for mathematics. All students are capable of expressing mathematical thinking and contributing to the classroom community. Students learn new ways of looking at problem solving by working with and listening to each other.

- Integrate Relevant Word Problems: Contextualize equations using word problems that reference student’s interests and cultures.
  
  **Example:** Create and use word problems that students will be able to relate to, have prior knowledge of, includes their interests, current events and/or are relevant to real-world situations. Using content the 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/)
### Differentiated Instruction

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

<table>
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<tr>
<th>Time/General</th>
<th>Processing</th>
<th>Comprehension</th>
<th>Recall</th>
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</thead>
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<tr>
<td>- Extra time for assigned tasks</td>
<td>- Extra Response time</td>
<td>- Precise processes for balanced</td>
<td>- Teacher-made checklist</td>
</tr>
<tr>
<td>- Adjust length of assignment</td>
<td>- Have students verbalize steps</td>
<td>math instructional model</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>- Short manageable tasks</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>- Brief and concrete directions</td>
<td>- Visual and verbal reminders</td>
</tr>
<tr>
<td>- Provide lecture notes/outline</td>
<td>- Provide a warning for transitions</td>
<td>- Provide immediate feedback</td>
<td>- Graphic organizers</td>
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<td></td>
<td>- Partnering</td>
<td>- Small group instruction</td>
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<tr>
<td></td>
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<td>- Emphasize multi-sensory learning</td>
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<thead>
<tr>
<th>Assistive Technology</th>
<th>Tests/Quizzes/Grading</th>
<th>Behavior/Attention</th>
<th>Organization</th>
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<tbody>
<tr>
<td>- Computer/whiteboard</td>
<td>- Extended time</td>
<td>- Consistent daily structured routine</td>
<td>- Individual daily planner</td>
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<tr>
<td>- Tape recorder</td>
<td>- Study guides</td>
<td>- Simple and clear classroom rules</td>
<td>- Display a written agenda</td>
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<td>- Video Tape</td>
<td>- Shortened tests</td>
<td>- Frequent feedback</td>
<td>- Note-taking assistance</td>
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<td></td>
<td>- Read directions aloud</td>
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<td>- Color code materials</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Accommodate Based on Content Specific Needs</strong></td>
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</tbody>
</table>

- Chart academic vocabulary with visual representations
- Anchor charts to model strategies
- Graphic organizers (examples include: venn diagram, 4 square graphic organizer for math word problems, K-W-L etc.)
- Translation dictionary
- Teacher modeling
- Students can utilize math journals to write notes, copy solution steps, and translate terms and key vocabulary.
- Grid paper to create accurate mathematical models and verify the area and perimeter of figures
- Utilize technological programs which provide verbal and visual instruction in native and/or second language.
- Use interactive technology to improve multiplication and division fact fluency and accuracy.
- Fraction equivalency cubes
- Fraction towers
- Use of Cuisenaire Rods and linking cubes to show the decomposing of fractions
- Fraction cubes, strips, tiles, and circles to show the size of fractional pieces
- Place value chart for whole numbers and decimals
- Calculators to verify computational accuracy
- Create and provide a list of properties of operations as strategies to multiply and divide whole numbers.
- Number line to create line plots
- Tenths/ hundredths grids
- Fraction and decimal tiles
- Input/ output table to show conversion of units
- Base ten blocks
Interdisciplinary Connections

*Model interdisciplinary thinking to expose students to other disciplines.*

**Health Connection:**

How Many CC’s?: 2.1.4.A.2

- Students will discuss the use of CC’s, cubic centimeters, to measure fluids in the medical field. This task asks students to replace blood that has been lost after surgery with a blood product called albumin. Learn more about albumin at [http://www.wisegeek.org/what-is-albumin.htm](http://www.wisegeek.org/what-is-albumin.htm).

A Chance Surgery: 2.1.4.C.1, 2.2.4.E.2

- Students will be given information on biliary atresia, which is when bile cannot be expelled from the liver, and that 2/3 of people diagnosed will need a liver transplant. They will work to find the amount of people that need transplants per year. Learn more about the liver at [http://kidshealth.org/kid/htbw/liver.html](http://kidshealth.org/kid/htbw/liver.html).

**Social Studies Connection:**

Flag Fractions: 6.1.4.A.14

- Students will view flags from countries around the world and what the colors and symbols represent. They will create a flag and name the country the flag will represent. They can create a country or change the flag to an existing country. View the most famous flags at [http://flagpedia.net/](http://flagpedia.net/) and learn what the colors and symbols represent at [http://www.enchantedlearning.com/geography/flags/colors.shtml](http://www.enchantedlearning.com/geography/flags/colors.shtml).

Planning a 5K Race: 6.1.4.B.3

- Students will look at a map to see different running trails. They will make conjectures based on the map about the distance of each trail and the geographical features seen. The Central Park Runner’s Map can be used as an example and found at [http://www.centralpark.com/usr/maps/CentralParkRunningMap.pdf](http://www.centralpark.com/usr/maps/CentralParkRunningMap.pdf).
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

### 4.MD.B.4.
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

### 4.NF.B.4.
Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.]

- **4.NF.B.4a.**
  Understand a fraction \( \frac{a}{b} \) as a multiple of \( \frac{1}{b} \).
  *For example, use a visual fraction model to represent \( \frac{5}{4} \) as the product \( 5 \times \left( \frac{1}{4} \right) \), recording the conclusion by the equation \( \frac{5}{4} = 5 \times \left( \frac{1}{4} \right) \).*

- **4.NF.B.4b.**
  Understand a multiple of \( \frac{a}{b} \) as a multiple of \( \frac{1}{b} \), and use this understanding to multiply a fraction by a whole number.
  *For example, use a visual fraction model to express \( 3 \times \left( \frac{2}{5} \right) \) as \( 6 \times \left( \frac{1}{5} \right) \), recognizing this product as \( \frac{6}{5} \). (In general, \( n \times \left( \frac{a}{b} \right) = \left( n \times a \right) / b \)).

- **4.NF.B.4c.**
  Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat \( \frac{3}{8} \) of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?*

### 4.NF.C.5.
Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *For example, express \( \frac{3}{10} \) as \( \frac{30}{100} \), and add \( \frac{3}{10} + \frac{4}{100} = \frac{34}{100} \).[Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.]

### 4.NF.C.6.
Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite \( 0.62 \) as \( \frac{62}{100} \); describe a length as \( 0.62 \) meters; locate \( 0.62 \) on a number line diagram.* [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.]
New Jersey Student Learning Standards

4.NF.C.7.
Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual model. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.]

4.MD.A.2.
Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

4.NBT.B.4.
Fluently add and subtract multi-digit whole numbers using the standard algorithm. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.]
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.
**Grade:** Four  
**Unit:** 3 (Three)  
**Topic:** Building Fractions and Decimal Notation

**NJSLS:**  
4.MD.B.4, 4.NF.B.4a, 4b, 4.NF.B.4c, 4.NF.C.5, 4.NF.C.6, 4.NF.C.7, 4.MD.A.2, 4.NBT.B.4

**Unit Focus:**  
- Build fractions from unit fractions  
- Represent and interpret data  
- Understand decimal notation for fractions and compare decimal fractions  
- Solve problems involving measurement and conversion of measurements  
- Use place value understanding and properties of operations to add and subtract

**New Jersey Student Learning Standard:**  
4.MD.B.4: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

**Student Learning Objective 1:** Make a line plot to display a data set in measurements in fractions of a unit (1/2, 1/4, 1/8) and use it to solve problems involving addition and subtraction of fractions with like denominators.

**Modified Student Learning Objectives/Standards:**  
M.EE.4.MD.B.4.a: Represent data on a picture or bar graph given a model and graph to complete.  
M.EE.4.MD.B.4.b: Interpret data from a picture or bar graph.

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<thead>
<tr>
<th>MPs</th>
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<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 4 | 4.MD.4-1  
MP 5 | 4.MD.4-2  
• Tasks may include mixed numbers with stated denominators. | Given a set of data, create a graph, describe a context for the data, explain a possible collection method and report what was learned from the data. | How is data collected?  
How do we determine the most appropriate graph to use to display the data? | What’s the Story?  
Bugs, Giraffes, Elephants, and More  
Reading Survey |

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Reading Survey
| Fractions equivalent to whole numbers are limited to 0 through 5. | When counting fractional parts on a number line, use the fraction name instead of the whole-number name. For example, if two-fourths is represented on the line plot three times, then there would be six fourths. Solve problems involving addition and subtraction of fractions with like denominators by using data presented in the line plots. Challenge students to reason using appropriate mathematical language while interpreting data on a line plot. Develop a clear understanding for the need to label line plots appropriately. Rulers can be used to create line plots and review equivalent fractions using eighths, fourths, and halves. Given a data set consisting of measurements in fractions of a unit, create a line plot. **The scale of a line plot must be equally spaced as in a number line.** | How do we make a line plot to display a set of data? What kinds of questions can be answered using a line plot? How do graphs help explain real-world situations? Line plots are visual ways to display data, can be used to analyze data, and help see trends in the data. Why would you display data graphically? | **How High Did it Bounce?** **Measuring Strings** **Buttons** |
problems involving addition and subtraction of fractions with like denominators using key vocabulary in simple sentences.

For students who need to review the relative size of fractional units, folding square paper into various units of halves, thirds, fourths, and eighths can be beneficial. Allow students time to fold, cut, label and compare the units in relation to the whole and each other.

Activate or supply background knowledge needed in order to master the lesson objective.

**ELL Strategies:**
Expose students to other formats of notating fractions, such as those which use a diagonal to separate numerator from denominator.

Clarify, compare, and make connections to math words in discussion, particularly during and after practice.

Allow ELL students to talk to a peer in their native language when necessary to clarify understanding and clear up misunderstandings.

Demonstrate and explain orally and in writing how to make a line plot to display a data set in measurements in
fractions of a unit and use it to solve problems involving addition and subtraction of fractions with like denominators using key vocabulary in simple sentences.

**New Jersey Student Learning Standard:**

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

4.NF.B.4a: Understand a fraction \(a/b\) as a multiple of \(1/b\). For example, use a visual fraction model to represent \(5/4\) as the product \(5 \times (1/4)\), recording the conclusion by the equation \(5/4 = 5 \times (1/4)\).

4.F.4.B.4b: Understand a multiple of \(a/b\) as a multiple of \(1/b\), and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express \(3 \times (2/5)\) as \(6 \times (1/5)\), recognizing this product as \(6/5\). (In general, \(n \times (a/b) = (n \times a)/b\.).

**Student Learning Objective 2:** Multiply a fraction by a whole number using visual fraction models and equations, demonstrating a fraction \(a/b\) as a multiple of \(1/b\).

**Modified Student Learning Objectives/Standards:** N/A

<table>
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<tr>
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<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 1 | 4.NF.4a  
4.NF.4b-1  
4.NF.4b-2 | Extend the idea of multiplication as repeated addition  
Use and create visual fraction models, such as number lines or area models, to multiply a whole number by a fraction.  
Present opportunities for students to see that multiplying whole numbers by fractions results in a smaller product. This is opposite to a previous idea | One factor in a multiplication problem tells you the number of groups and one tells you the number of items in the group, OR one factor can tell you the number of rows/groups and the items in the row or the number of columns/groups and the items in the columns.  
If there is a whole number of groups, repeated addition can be | IFL Task(s) – “Building Non-Unit Fractions”  
**Part 2 Tasks:**  
Thirds and Sixths  
Fractional Number Lines  
Watching TV  
Eating Apples  
The End Product |
| MP 4 |  |  |  | |
| MP 5 |  |  |  | |
| MP 7 |  |  |  | |

IFL PBA Tasks:
- Tasks involve expressing \( a/b \) as a multiple of \( a/b \) as a fraction.
- Results may equal fractions greater than 1 (including fractions equal to whole numbers limited to 0 through 5).
- Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

**4.C.4-3**

- Base arithmetic explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in his/her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in 4.NF.4a
- Tasks have “thin context” or no context.
- Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

### 4.C.4-3

- A product can be written as two or more different but equivalent expressions as long as the total number of items in each set is the same (e.g., \( 2 \times \frac{1}{4} = 4 \times \frac{1}{8} \)).
- How can we model the multiplication of a whole number by a fraction?
- How is multiplication of fractions by a whole number similar to repeated addition of fractions?
- How is multiplication of a fraction similar to division of whole numbers?

### Example:

\[
3 \times \frac{2}{5} = 6 \times \frac{1}{5} = 6/5
\]

![Diagram showing multiplication of a fraction]

### Example:

If each person at a party eats \( \frac{3}{8} \) of a pound of roast beef, and there are 5 people at the party, how many pounds of roast beef are needed? Between what two whole numbers does your answer lie?

---

### Portion of a Whole

**Bill’s Claim**

**Adding and Multiplying Mixed Numbers**

**Additional Tasks:**
- **Area Models**
- **The Cake Shop**
- **How Many CC’s**
- **Drawing a Model**
- **Extending Multiplication from Whole Numbers to Fractions**
<table>
<thead>
<tr>
<th>Tasks may include whole numbers. Whole numbers are limited to 0 through 5.</th>
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<tbody>
<tr>
<td><strong>4.C.4-4</strong></td>
</tr>
<tr>
<td>Base arithmetic explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in his/her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in 4.NF.4b</td>
</tr>
<tr>
<td>Tasks have “thin context” or no context.</td>
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<td>Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.</td>
</tr>
<tr>
<td><strong>4.C.7-4</strong></td>
</tr>
<tr>
<td>Base explanations/reasoning on a number line diagram (whether provided in the prompt or constructed by the student in his/her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in 4.NF.4b</td>
</tr>
</tbody>
</table>

**SPED Strategies:**
Illustrate and describe orally and in writing how to multiply a fraction by a whole number using visual fraction models and equations, using key vocabulary in simple sentences. Require students to complete a class project that includes activities highlighting the learning modalities.

Present lessons to students in a variety of formats (e.g., video clips, online resources, audio/manipulatives, interactive whiteboard).

When working in groups, consider allowing students to either serve as the reporter for their learning group sharing the findings, or allowing them to use online virtual manipulatives.

Clearly model steps, procedures, and questions to ask when solving mathematical concepts.

How does my understanding of whole number computation help me understand computation of fractions and mixed numbers?
| student in his/her response) Content Scope: Knowledge and skills articulated in 4.NF.4a, 4.NF.4b | Provide students with multiplication charts and color coded handouts with examples.  
**ELL Strategies:** Provide a multilingual math glossary.  
Create charts and posters in L1(student’s native language).  
Utilize an interactive word wall in native language.  
Illustrate and describe orally and in writing how to multiply a fraction by a whole number using visual fraction models and equations, in L1 (student’s native language) and/or use gestures, pictures and selected words. |
New Jersey Student Learning Standards:

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

4.NF.B.4a: Understand a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$. For example, use a visual fraction model to represent $\frac{5}{4}$ as the product $5 \times (\frac{1}{4})$, recording the conclusion by the equation $\frac{5}{4} = 5 \times (\frac{1}{4})$.

4.F.4.B.4b: Understand a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express $3 \times (\frac{2}{5})$ as $6 \times (\frac{1}{5})$, recognizing this product as $\frac{6}{5}$. (In general, $n \times (\frac{a}{b}) = (n \times a)/b$.)

Student Learning Objective 3: Multiply a fraction by a whole number, using a visual fraction model and equations to demonstrate that a multiple of $\frac{a}{b}$ is the product of $\frac{1}{b}$ and a whole number.

Modified Student Learning Objectives/Standards: N/A

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<tbody>
<tr>
<td>MP 1</td>
<td>4.NF.4a</td>
<td>Multiply a fraction by a whole number.</td>
<td>One factor in a multiplication problem tells you the number of groups and one tells you the number of items in the group, OR one factor can tell you the number of rows/groups and the items in the row or the number of columns/groups and the items in the columns.</td>
<td>IFL Task(s) – “Building Non-Unit Fractions” Part 2 Tasks: Thirds and Sixths Fractional Number Lines Watching TV Eating Apples The End Product</td>
</tr>
<tr>
<td>MP 4</td>
<td>4.NF.4b-1</td>
<td>Solve real world problems by multiplying a fraction by a whole number, using visual fraction models and equations to represent the problem.</td>
<td>If there is a whole number of groups, repeated addition can be used because the amount in each group can be added repeatedly.</td>
<td></td>
</tr>
<tr>
<td>MP 5</td>
<td>4.NF.4b-2</td>
<td>Represent $n \times (\frac{a}{b})$ as $(n \times a)/b$ in a visual fraction model.</td>
<td>When multiplying with at least one factor greater than one, the product will be greater than at</td>
<td></td>
</tr>
<tr>
<td>MP 7</td>
<td></td>
<td>Use and create visual fraction models, such as number lines or area models, to multiply a whole number by a fraction.</td>
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<tr>
<td></td>
<td></td>
<td>Provide contextualized situations that require equations and visual representations to support strategies and defend answers.</td>
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</tbody>
</table>

- Tasks do not have a context.
- Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy.
- Tasks involve expressing $\frac{a}{b}$ as a multiple of $\frac{a}{b}$ as a fraction.
- Results may equal fractions greater than 1.
| 4.C.4-3 | Present opportunities for students to see that multiplying whole numbers and mixed numbers by fractions results in a smaller product. This is opposite to a previous idea learned; the operation of multiplication produces a larger product. Discuss the conversion from a mixed number to an improper fraction and vice versa and emphasize that they both represent the same quantity. **SPED Strategies:** Model each step before students begin. As a class, create an anchor chart with examples. Visual fraction models (area models, tape diagrams, number lines) should be used and created by students during their work with this standard. Illustrate and describe orally and in writing how to multiply a fraction by a whole number using visual fraction models and equations, using key vocabulary in simple sentences. **ELL Strategies:** Illustrate and describe orally and in writing how to multiply a fraction by a whole number using visual fraction models and equations, in L1 (student’s least one of the factors because more than one group of the other factor is being utilized. A product can be written as two or more different but equivalent expressions as long as the total number of items in each set is the same (e.g., \( 2 \times \frac{1}{4} = 4 \times \frac{1}{8} \)). How does my understanding of whole number computation help me understand computation of fractions and mixed numbers? |
|---|---|---|
| 4.C.4-4 | Adding and Multiplying Mixed Numbers **Additional Tasks:** Extending Multiplication from Whole Numbers to Fractions Reasoning with Fractions (Part 1 Only) Chris’s Cookies |
- Base arithmetic explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in his/her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in 4.NF.4b
- Tasks have “thin context” or no context.
- Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

  4.C.7-4

- Base explanations/reasoning on a number line diagram (whether provided in the prompt or constructed by the student in her response) Content Scope: Knowledge and skills articulated in 4.NF.4a, 4.NF.4b.

  native language) and/or use gestures, pictures and selected words.

  Model each step before students begin. As a class, using L1 (student’s native language) create anchor chart with examples.

  Mathematics Reference Sheet in native language with examples.

  Allow ELL students to talk to a peer in their native language when necessary to clarify understanding and clear up misunderstandings.
New Jersey Student Learning Standard:
4.NF.4.B.4c: Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?

Student Learning Objective 4: Solve 1-step word problems involving multiplication of a fraction by a whole number, using visual fraction models and equations to represent the problem.

Modified Student Learning Objectives/Standards: N/A

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</thead>
<tbody>
<tr>
<td>MP 1</td>
<td>4.NF.4c</td>
<td>Utilize visual fraction models, such as number lines or area models, to solve word problems related to multiplying a whole number by a fraction.</td>
<td>One factor in a multiplication problem tells you the number of groups and one tells you the number of items in the group, OR one factor can tell you the number of rows/groups and the items in the row or the number of columns/groups and the items in the columns.</td>
<td>IFL Task(s) – “Building Non-Unit Fractions”</td>
</tr>
<tr>
<td>MP 4</td>
<td></td>
<td>Expose students to various contexts to help them understand the connections between models and their corresponding equations.</td>
<td>If there is a whole number of groups, repeated addition can be used because the amount in each group can be added repeatedly.</td>
<td>Part 2 Tasks: Thirds and Sixths Fractional Number Lines</td>
</tr>
<tr>
<td>MP 5</td>
<td></td>
<td>Address the misconception that multiplying always makes numbers larger and division always makes number smaller. Students make this assumption because they are used to seeing it with whole numbers. Provide a counterexample to demonstrate why it is false.</td>
<td>When multiplying with at least one factor greater than one, the product will be greater than at least one of the factors because more than one group of the other factor is being utilized.</td>
<td>Watching TV</td>
</tr>
<tr>
<td>MP 7</td>
<td></td>
<td>Solve real world problems by multiplying a fraction by a whole number.</td>
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<td>Eating Apples</td>
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<td>The End Product</td>
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<td></td>
<td>Additional Tasks: Birthday Cookout</td>
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<td></td>
<td>A Chance Surgery</td>
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<td></td>
<td>Chocolate Bar Fractions</td>
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</tbody>
</table>
### Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

**4.C.6-3**

- 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. Content Scope: Knowledge and skills articulated in 4.NF.3d, 4.NF.4c
- Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) so as to keep computational difficulty lower.

### A product can be written as two or more different but equivalent expressions as long as the total number of items in each set is the same (e.g., $2 \times \frac{1}{4} = 4 \times \frac{1}{8}$).

**SPED Strategies:**

- Clarify, compare, and make connections to math words in discussion, particularly during and after practice.
- Model problem-solving sets with drawings and graphic organizers (e.g., bar or tape diagram), giving many examples and visual displays.
- Color-code or highlight key words in math word problems.
- Let the student use a flowchart to plan strategies for problem solving.
- Guide students as they select and practice using their own graphic organizers and models to solve.
- Use direct instruction for vocabulary with visual or concrete representations.
- Use explicit directions with steps and procedures enumerated.
- Let students choose their mode of response: written, oral, concrete, pictorial, or abstract.

**How does my understanding of whole number computation help me understand computation of fractions and mixed numbers?**

**Going the Distance**
| Multi-step problems must have at least 3 steps | ELL Strategies: Explain how to write and solve 1-step word problems involving multiplication of a fraction by a whole number in L1 (student’s native language) and/or use gestures, pictures and selected words. Provide students with direct instruction for vocabulary with visual or concrete representations in L1 (student’s native language). Allow ELL students to talk to a peer in their native language when necessary to clarify understanding and clear up misunderstandings. Use cloze sentences to explain their answers. |   |
New Jersey Student Learning Standard:
4.NF.C.5: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.]

Student Learning Objective 5: Add two fractions with respective denominators of 10 and 100 by writing each fraction with denominator 100.

Modified Student Learning Objectives/Standards: N/A

<table>
<thead>
<tr>
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<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 7</td>
<td>4.NF.5</td>
<td>Express decimals to the hundredths as the sum of two decimals or fractions (equivalent fractions).</td>
<td>Fractions and decimals are named according to the number of same-size items needed to compose one whole (10 tenths are needed to make one whole) and how many of those items are being considered in reference to one whole (10 tenths are needed to make one; six-tenths means you are considering six one-tenth sized units, or ( \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} )). Fractions and decimals can be renamed to form equivalent values [e.g., ( \frac{1}{10} ) or 0.1 is the same as ( \frac{10}{100} ) or 0.10], and the forms are equivalent if the same portion of the whole is represented or they</td>
<td>IFL Task(s)-“Fractions and Decimals: Writing and Comparing Decimal Numbers” IFL PBA Tasks: Paper Airplanes Task Additional Tasks: Karen’s Garden Filling the Jar Children’s Shirts</td>
</tr>
<tr>
<td></td>
<td>4.NF.Int.2</td>
<td>Example: 0.32 would be the sum of 3 tenths and 2 hundredths. Using this understanding, students can write 0.32 as the sum of two fractions ( \frac{3}{10} + \frac{2}{100} ). Utilize decimal grids, base ten blocks, and other place value models to demonstrate the equivalency between fractions that have a 10 as a denominator and those that have 100. Represent (drawings, numbers, equations) to illustrate and explain equivalence between tenths and hundredths. Students will combine tenths and hundredths in context.</td>
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</tbody>
</table>

- Tasks do not have a context
- Solve one-step addition word problems.
- Tasks are one of two kinds: Add To with result unknown, or Put Together with result unknown.
- See Table 2, p. 9 of the OA Progression document; these situations are sampled equally
Partitions to illustrate 10-to-1 part-whole relationships and names resulting values with respect to a referent whole (one, tenths, and hundredths).

Use decimal combinations to understand the value and magnitude of tenths and hundredths.

Add two fractions with respective denominators of 10 and 100 using equivalent fractions. This work in fourth grade lays the foundation for performing operations with decimal numbers in fifth grade.

**SPED Strategies:**
Students can use fraction bars/cubes, graph paper, and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100.

Solve real-world problems in order to increase student interest and make connections (following a recipe and distance).

**ELL Strategies:**
In small groups, students can use base ten blocks, graph paper, and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100.

represent the same point on the number line.

Decimal numbers are notated in accordance with the 10-to-1 relationship involved between units (e.g., 10 tenths make one whole, 10 hundredths make one-tenth, 10 thousandths make one-hundredth, etc.).

Any representation (e.g., decimal grids, numerals/notation, length model, or equations) of fractions or decimals illustrates the relative size of each piece (tenth, hundredth, thousandth, etc.) relative to a referent whole.

Tenths can be expressed using an equivalent fraction with a denominator of 100.

Addition can only take place when the fractions have a common denominator.
<table>
<thead>
<tr>
<th></th>
<th>Know, use, and make the most of student’s cultural and home experiences. Build on the student’s background knowledge. Some ELL students learn to add, subtract, multiply, and divide using different computational methods than commonly taught in U.S. schools.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Break the information into steps or key components and monitor the student’s comprehension as the information is presented.</td>
<td></td>
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<tr>
<td></td>
<td>Demonstrate and explain orally and in writing how to add two fractions with respective denominators of 10 and 100 in L1 (student’s native language) and/or use gestures, pictures and selected words.</td>
<td></td>
</tr>
</tbody>
</table>
New Jersey Student Learning Standard:
4.NF.C.6: Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.]

Student Learning Objective 6: Given decimal notation, write fractions having denominators of 10 or 100.

Modified Student Learning Objectives/Standards: N/A

<table>
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<tr>
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<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 7</td>
<td>4.NF.6</td>
<td>Decimals are introduced for the first time. Students should have ample opportunities to explore and reason about the idea that a number can be represented as both a fraction and a decimal. Show a decimal representation from base-ten blocks by shading on a 10 x 10 grid. Write decimals for fractions with denominators of 10 or 100 to show their equivalency. Represent decimals in word form with digits and the decimal place value, such as 4/10 would be 4 tenths. Represents (drawings, numbers, and equations) to illustrate and explain equivalence between tenths and hundredths. Students will combine tenths and hundredths in context.</td>
<td>Fractions and decimals can be renamed to form equivalent values [e.g., or 0.1 is the same as (\frac{10}{100}) or 0.10], and the forms are equivalent if the same portion of the whole is represented or they represent the same point on the number line. Decimal numbers are notated in accordance with the 10-to-1 relationship involved between units (e.g., 10 tenths make one whole, 10 hundredths make one-tenth, 10 thousandths make one-hundredth, etc.).</td>
<td>IFL Task(s)- “Fractions and Decimals: Writing and Comparing Decimal Numbers” IFL PBA Tasks: Comparing Decimals Task Additional Tasks: Tickets Base Ten Decimals Flag Fractions Dismissal Duty Dilemma Where Am I Now? How Much Farther?</td>
</tr>
<tr>
<td>4.NF.Int.2</td>
<td>Solve one-step addition word problems. Tasks are one of two kinds: Add To with result unknown, or Put Together with result unknown. See Table 2, p. 9 of the OA Progression document; these situations are sampled equally.</td>
<td></td>
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</table>

39 | Page
| Uses 1-by-10 and 10-by-10 decimal grids, numerals (fractions, decimals), and number lines. | Expose students to pictorial and symbolic representations of fractions. |
| Show a decimal representation from base-ten blocks by shading on a 10 x 10 grid. | Write decimals for fractions with denominators of 10 or 100 to show their equivalency. |
| Represent decimals in word form with digits and the decimal place value, such as $\frac{4}{10}$ would be 4 tenths. | Represent values on a number line as a fraction and decimal. |
| Read, write, and say decimal and fractional numbers to the hundredths. | Decompose fractional and decimal numbers. |
| Any representation (e.g., decimal grids, numerals/notation, length model, or equations) of fractions or decimals illustrates the relative size of each piece (tenth, hundredth, thousandth, etc.) relative to a referent whole. | Is the Tire Full Yet? Expanding Decimals with Money |
Example:
Students represent values such as 0.32 or \(\frac{32}{100}\) on a number line. \(\frac{32}{100}\) is more than \(\frac{30}{100}\) (or \(\frac{3}{10}\)) and less than \(\frac{40}{100}\) (or \(\frac{4}{10}\)). It is closer to \(\frac{30}{100}\) so it would be placed on the number line near that value.

![Number line with 0.32 marked]

Discuss the relationship between place value (decimals) and fractions.

**SPED Strategies:**
Demonstrate and explain orally and in writing how to use decimal notation to write fractions with denominators of 10 or 100 using key vocabulary in simple sentences.

Utilize fraction/decimal number lines and place value chart/placemats.

Review prerequisite skills before introducing new concepts.

**ELL Strategies:**
Create a visual model as a class to use as a future reference.
New Jersey Student Learning Standard:
4.NF.C.7: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. [Grade 4 expectations in this domain are limited to denominators of 2, 3, 4, 5, 6, 8, 10, 12 and 100.]

Student Learning Objective 7: Compare two decimals to hundredths by reasoning about their size, demonstrating that comparisons are valid only when the two decimals refer to the same whole; record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

Modified Student Learning Objectives/Standards: N/A

<table>
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<tr>
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<tbody>
<tr>
<td>MP 5 MP 7</td>
<td>4.NF.7</td>
<td>Gain a conceptual understanding that the value of each place is 10 times the value of the place to its immediate right.</td>
<td>Fractions and decimals can be renamed to form equivalent e.g., $\frac{1}{10}$ or 0.1 is the same as $\frac{10}{100}$ or 0.10] and the forms are</td>
<td>IFL Task(s)- “Fractions and Decimals: Writing and Comparing Decimal Numbers”</td>
</tr>
</tbody>
</table>

In L1 (student’s native language) review prerequisite skills before introducing new concepts.

Demonstrate and explain orally and in writing how to use decimal notation to write fractions with denominators of 10 or 100 in L1 (student’s native language) and/or use gestures, pictures and selected words.

Let students choose their mode of response: written, oral, concrete, pictorial, or abstract.
- Justifying conclusions is not assessed here.
- Prompts do not provide visual fraction models; students may, at their discretion, draw visual fraction models as a strategy.

| Explain the reasoning for decimal comparisons and express their relationship using the symbols >, <, or =. Justify comparisons using visual models (number lines, 10 by 10 grids, money models, pictures, or place value representations). Explain that comparisons are valid only when the two decimals refer to the same whole. Compare two decimals to hundredths by reasoning about their size. Utilize dimes and pennies to represent tenths and hundredths in relation to a dollar. Use a measurement context to understand the value of tenths and hundredths and the magnitude of decimals. Write number lines, equations, and place value charts. Use decimal combinations to understand the value and magnitude of tenths and hundredths. Represents (drawings, numbers, and equations) to illustrate and explain equivalence between tenths and hundredths. equivalent if the same portion of the whole is represented or they represent the same point on the number line. Any representation (e.g., decimal grids, numerals/notation, length model, or equations) of fractions or decimals illustrates the relative size of each piece (tenth, hundredth, thousandth, etc.) relative to a referent whole. Fractions and decimals with the same-sized or valued pieces can be compared. The comparison can be done if the value of the pieces being compared is alike with respect to a same-sized whole so only the number of pieces needs to be considered. If decimals with different-sized or valued pieces are being compared, the decimals must be renamed before being compared because the size/value of each piece being considered in relation to a same-sized whole is different. When you compare two decimals, how can you determine which one has the greater value? |

IFL PBA Tasks:
- Comparing Decimals Task
- Paper Airplanes Task
Additional Tasks:
- Throw the Ball
- Decimal Fraction Number Line
- Trash Can Basketball
- Planning a 5k Race
- Who Jumped Farther?
- Making Punch
- Using Place Value
Some misconceptions that should be addressed when comparing decimals are: longer is larger, zeroes can be ignored, the decimal equals a “reciprocal”, such as 0.3 as $\frac{1}{3}$.

The decimal point is used to signify the location of the ones place, but its location may suggest is that there should be a “oneths” place to its right in order to create symmetry with respect to the decimal point. However, because one is the basic unit from which the other base ten units are derived, the symmetry occurs instead with respect to the ones place.

Exposé students to pictorial and symbolic representations of fractions.

**Example:**
Draw a model to show that 0.3 < 0.5.

<table>
<thead>
<tr>
<th>Why is the number 10 important in our number system?</th>
</tr>
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<tbody>
<tr>
<td>What patterns occur on a number line made up of decimal fractions?</td>
</tr>
<tr>
<td>How do 10 x10 grids represent tenths and hundredths?</td>
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</tbody>
</table>
**SPED Strategies:**
Promote active involvement of students by asking questions or teaching in small groups.

Break the information into steps or key components and monitor the student’s comprehension as the information is presented.

Build area models and use graph paper to represent the fraction models.

**ELL Strategies:**
In L1 (student’s native language) review prerequisite skills and concepts.

Compare and explain orally and in writing, decimals to hundredths in L1 (student’s native language) and/or using gestures, pictures and selected words.

Using manipulatives/visuals such as decimal number discs to thousandths place value.

Explain orally and in writing how to compare two decimals to hundredths by reasoning about their size using L1 (student’s native language) and/or use gestures, pictures and selected, illustrated single words.
Be sure to enunciate /th/ at the end of tenths/hundredths to help English language learners distinguish tenths and tens. Try speaking slower, pause more frequently, or couple language with a tape diagram. Check for student understanding and correct pronunciation of fraction names.

New Jersey Student Learning Standard:
4.MD.A.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Student Learning Objective 8: Solve word problems involving simple fractions or decimals that incorporate measurement comparisons of like units (including problems that require measurements given in a larger unit in terms of a smaller unit).

Modified Student Learning Objectives/Standards:

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<tbody>
<tr>
<td>MP 4</td>
<td>4.MD.2-1</td>
<td>Tape or number line diagrams that feature a measurement scale can represent measurement quantities. For example, rulers, a timetable showing hours throughout the day, or volume measure on the side of a container. Competencies are combined from different domains to solve measurement</td>
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<tr>
<td>MP 5</td>
<td></td>
<td>How can we use a diagram to show the answer to a measurement word problem? To measure something according to a particular attribute means you compare the object to a unit and determine how many units are needed to have the same amount as the object.</td>
<td>Book Order</td>
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<td>Weighing the Books</td>
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<td>Margie Buys Apples</td>
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<td>Water Balloon Fun!</td>
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<td></td>
<td>More Punch, Please</td>
</tr>
<tr>
<td>featuring a measurement scale. Tasks may include measuring distances to the nearest cm or mm. Units of mass are limited to grams and kilograms. <strong>4.MD.2-2</strong> Situations involve two measurements given in the same units, one a whole-number measurement and the other a non-whole-number measurement (given as a fraction). Tasks may present number line diagrams featuring a measurement scale. Tasks may include measuring distances to the nearest cm or mm. Units of mass are limited to grams and kilograms. Tasks will not include division of fractions. problems using all four arithmetic operations. Know relative sizes of measurement units within one system. For example, km, m, cm. Convert measurement units from one form to another. Solve word problems (using addition, subtraction and multiplication) involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals and requiring expressing measurements given in a larger measurement unit in terms of a smaller measurement unit (conversion). Construct diagrams (e.g. number line diagrams) to represent measurement quantities. Relationships to measurement units can be expressed as functions. 12 inches = 1 foot or 1 foot = 12 inches. Provide contextualized examples that provide the opportunity to choose appropriate measurement and proper conversion.</td>
<td>How are units in the same system of measurement related? Measurements can be expressed in terms of a larger unit or smaller unit and still be equivalent. For example, liters and milliliters.</td>
<td>More Punch Please, Version 2 Too Heavy? Too Light?</td>
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</tbody>
</table>
**SPED Strategies:**
Elaborate on the problem-solving process. Read word problems aloud. Post a visual display of the problem-solving process. Have students check off or highlight each step as they work. Talk through the problem-solving process step-by-step to demonstrate thinking process. Before students solve, ask questions for comprehension, such as, “What unit are we counting? What happened to the units in the story?” Teach students to use self-questioning techniques, such as, “Does my answer make sense?”

Encourage students to explain their thinking and strategy for the solution.

Provide students with color coded notes, samples and number lines.

Allow the student to use a chart or table with basic math facts.

Color-code or highlight key words in math word problems.

**ELL Strategies:**
Demonstrate comprehension of word problems involving simple fractions and decimals that incorporate measurement comparisons by answering questions in L1 (student’s native language) and/or use gestures, pictures and selected, words.
Know, use, and make the most of student’s cultural and home experiences. Build on the student’s background knowledge.

Adjusting number words and correctly pronouncing them as fractions (fifths, sixths, etc.) may be challenging. If there are many English language learners in class, consider quickly counting together to practice enunciating word endings: halves, thirds, fourths, fifths, sixths, etc. Provide students with color coded notes and samples in L1 (student’s native language).

New Jersey Student Learning Standard:
4.NBT.B.4: Fluently add and subtract multi-digit whole numbers using the standard algorithm. [Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.]

Student Learning Objective 9: Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Modified Student Learning Objectives/Standards:
M.EE.4.NBT.4: Add and subtract two-digit whole numbers.

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<tr>
<td>MP 7</td>
<td>4.NBT.4-1</td>
<td>Recognize the need of regrouping and not just subtracting the smaller digit from the larger one. Utilize grid paper to line up similar place values when adding and subtracting.</td>
<td>What strategies can we use to help us make sense of a written algorithm?</td>
<td>Make Sense of an Algorithm, Reality Checking, Beehive Adventure</td>
</tr>
<tr>
<td>task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 16,999 + 3,501).</td>
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<tr>
<td>Tasks do not have a context and are not timed.</td>
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<tr>
<td>Grade 4 expectations in CCSSM are limited to whole numbers less than or equal to 1,000,000; for purposes of assessment, both of the given numbers should have 4 digits.</td>
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<tr>
<td>Tasks are not timed.</td>
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</tbody>
</table>

**4.NBT.4-2**

- The given subtrahend and minuend are such as to require an efficient/standard algorithm (e.g., 7263 – 4875 or 7406 – 4637). The subtrahend and minuend do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7300 – 6301). |

Fluency refers to accuracy, efficiency (using a reasonable amount of steps and times) and flexibility (variety of strategies learned previously if needed).

- Explain why algorithms work with the use of multiples of 10, place value, and diagrams of arrays and area. |

Computation involves taking apart and combining numbers using a variety of approaches.

- Flexible methods of computation involve grouping numbers in strategic ways: partial sum, regrouping, and trade first. |

One could use an alternate algorithm to check the answer to a problem.

**SPED Strategies:**

- In small groups students can practice adding and subtracting facts by using bundles, chips and other resources. |

Use of grid paper to assist students with lining up digits and emphasize place value and the meaning of each of the digits.

- Provide flashcards and or the opportunity to practice basic facts on the computer. |

How can we combine hundreds, tens, and ones in two or more numbers efficiently?

- The value of a number is determined by the place of its digits. |

Addition and subtraction algorithms are abbreviations or summaries of the connection between math drawings and written numerical work.

- Why does it help to know inverse relationships?

**Computation algorithm:**

- A set of predefined steps applicable to a class of problems that gives the correct result in every case when the steps are carried out correctly.

**Computation strategy:**

- Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another.
| Tasks do not have a context and are not timed. | Start with a students’ understanding of a certain strategy, and then make intentional connections for the student to the standard algorithm. This allows the student to gain understanding of the algorithm rather than just memorize certain steps to follow. |
| Grade 4 expectations in CCSSM are limited to whole numbers less than or equal to 1,000,000; for purposes of assessment, both of the given numbers should have 4 digits. | **ELL Strategies:**
Sequence orally the steps needed to add and subtract two multi-digit whole numbers in L1 (student’s native language) and/or use gestures, examples, and selected, technical words.

Have students peer tutor classmates who are having difficulties applying standard algorithms in addition and subtraction.

Use technology to practice adding and subtracting single digit number and use grid paper to assist students with lining up digits.

Explain directions in L1 (student’s native language) to ensure understanding of the task. |
Integrated Evidence Statements

4.NF.Int. 1: Solve one-step word problems requiring integration of knowledge and skills articulated in 4.NF. Content Scope: 4.NF
- Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.
- Word problems shall include a variety of grade-level appropriate applications and contexts.

4.Int.7: Solve one-step word problems involving adding or subtracting two four-digit numbers.
- The given numbers are such as to require an efficient/standard algorithm (e.g., 7263 + 4875, 7263 – 4875, 7406 – 4637). The given numbers do not suggest any obvious ad hoc or mental strategy (as would be present, for example, in a case such as 6,999 + 3,501 or 7300 – 6301).
- Word problems shall include a variety of grade-level appropriate applications and contexts.

4.Int.8: Solve addition and subtraction word problems involving three four-digit addends, or two four-digit addends and a four-digit subtrahend.
- The given numbers are such as to require an efficient/standard algorithm (e.g., 7263 + 4875 + 6901). The given numbers do not suggest any obvious ad hoc or mental strategy (as would be present, for example, in a case such as 6,999 + 3,501 - 5,000).

4.C.4-5: Base arithmetic explanations/reasoning on concrete referents such as diagrams (whether provided in the prompt or constructed by the student in her response), connecting the diagrams to a written (symbolic) method. Content Scope: Knowledge and skills articulated in 4.NF.C
- Tasks have “thin context” or no context.
- Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.

4.C.5-4: Distinguish correct explanation/reasoning from that which is flawed, and – if there is a flaw in the argument – present corrected reasoning. (For example, some flawed ‘student’ reasoning is presented and the task is to correct and improve it.) Content Scope: Knowledge and skills articulated in 4.NF.B
- Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.
- Results may equal fractions greater than 1 (including fractions equal to whole numbers limited to 0 through 5).

4.C.5-5: Distinguish correct explanation/reasoning from that which is flawed, and – if there is a flaw in the argument – present corrected reasoning. (For example, some flawed ‘student’ reasoning is presented and the task is to correct and improve it.) Content Scope: Knowledge and skills articulated in 4.NF.C
- Tasks have “thin context” or no context.
Integrated Evidence Statements

4.C.5-6 Distinguish correct explanation/reasoning from that which is flawed, and – if there is a flaw in the argument – present corrected reasoning. (For example, some flawed ‘student’ reasoning is presented and the task is to correct and improve it.) Content Scope: Knowledge and skills articulated in 3.OA.B, 3.NF, 3.MD.C

- Tasks may have scaffolding if necessary in order to yield a degree of difficulty appropriate to Grade 4.

4.C.6-3: 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. Content Scope: Knowledge and skills articulated in 4.NF.3d, 4.NF.4c

- Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) so as to keep computational difficulty lower.
- Multi-step problems must have at least 3 steps.

4.D.1 Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 4, requiring application of knowledge and skills articulated in Type I, Sub-Claim A Evidence Statements.

- Tasks may have scaffolding.
- Multi-step problems must have at least 3 steps.

4.D.2 Solve multi-step contextual problems with degree of difficulty appropriate to Grade 4, requiring application of knowledge and skills articulated in 3.OA.A, 3.OA.8, 3.NBT, and/or 3.MD.

- Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to Grade 4.
- Multi-step problems must have at least 3 steps.
- Tasks do not require a student to write a single equation with a letter standing for the unknown quantity in a two-step problem, and then solve that equation.
- Tasks may require students to write an equation as part of their work to find a solution, but students are not required to use a letter for the unknown.
- Addition, subtraction, multiplication and division situations in these problems may involve any of the basic situation types with unknowns in various positions (see NJSLS, Table 1, Common addition and subtraction, p. 93; NJSLS, Table 2, Common multiplication and division situations, p. 94; and the OA Progression document.)
Unit 3 Vocabulary

<table>
<thead>
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# References & Suggested Instructional Websites

<table>
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<th>Website</th>
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<tr>
<td><a href="http://www.internet4classrooms.com">www.internet4classrooms.com</a></td>
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<td><a href="http://www.k-5mathteachingresources.com/">www.k-5mathteachingresources.com/</a></td>
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<td>mathcommoncoreresources.wikispaces.com/Elementary+Resources</td>
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Field Trip Ideas

NATIONAL MUSEUM OF MATHEMATICS: 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. [http://momath.org/]

THE BOUNCE FACTORY: The Bounce Factory, Bricks 4 Kidz of Hunterdon Somerset and Team Makers of North Jersey have combined to create a unique and exciting Field Trip for students in grades 1st – 8th. It integrates STEM learning with fun, hands on activities that will focus on Science, Engineering and Math concepts. Students will build motorized models with LEGO® bricks and discuss engineering and physics principals • Enter the Bounce rooms for activities that will set in motion discussions of how physics impacts their play. • Learn about Math and Science concepts while playing integrative teambuilding activities that build their skills and promote working together. • Learn strategy and the power of collaboration while playing laser tag in a state of the art facility. [http://www.bouncefactorynj.com/]

LIBERTY SCIENCE CENTER - An interactive Science museum and learning center with math connections. There is a math guidebook for teachers to make connections with math. [http://lsc.org/plan-your-visit/]

NEW JERSEY JACKALS – Students will be able to watch a live minor league baseball game while figuring out the players batting averages, the earned run average, determine the win to loss ratio for the season, the pitch count, and other player statistics. [http://njjackals.pointstreaksites.com/view/njjackals/home-page-657]

STORMING ROBOTS – Engage your group in STEM-oriented Robotics Engineering Exploration. Each experience may range from three to five hours. Storming Robots is listed in the NASA’s Educational Robotics Matrix. SR’s program aims to capitalize creativity with engineering disciplines. Projects captivate young minds; stimulate critical thinking and creativity with mathematics. Key Activities will include Open-ended, but application-based mini-projects focusing on problem-solving skills with computational thinking skills. [http://www.stormingrobots.com/prod/techtrip.html]
**Field Trip Ideas**

**Buehler Challenger & Science Center** – Buehler Challenger & Science Center in New Jersey provides students, scouts, homeschoolers, and youth groups with the opportunity to “fly” simulated space missions using applied science and inquiry-based learning in our state-of-the-art simulators. 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, scouts, and youth groups use team-building and hands-on learning with a focus on STEM to complete their mission goal. Programming for day field trips is available for students Pre-K through 12th grade. In addition, the Center also offers overnight camp-ins, professional development and outreach programs, including StarLab Planetarium & Living in Space Experience.

http://www.bcsc.org/

**Panther Academy Planetarium** – Since 2004, the Panther Academy Planetarium has brought the universe to the Paterson community by educating and entertaining generations of school children and adults, inspiring imaginations and expanding horizons. Located in Paterson’s downtown business district and near Passaic County Community College, it is one of the best-equipped school planetariums in the United States. The planetarium resides at the heart of PANTHER, the Paterson Academy for Earth and Space Science. The Paterson school district equipped the planetarium with an interactive computerized system that supports Panther’s mathematics and science curriculum while providing district-wide weekly programs for elementary and secondary students. In addition to its value as an educational tool, the planetarium is also an important community resource, offering a variety of special presentations for public, college and community groups.

http://www.paterson.k12.nj.us/planetarium/