MATHEMATICS

Grade 4: Unit 1
Place Value & Operations with Whole Numbers
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 Standard (NJSLS). WIDA’s ELD standards advance academic language development across content areas ultimately leading to academic achievement for English learners. As English learners are progressing through the six developmental linguistic stages, this framework will assist all teachers who work with English learners to appropriately identify the language needed to meet the requirements of the content standard. At the same time, the language objectives recognize the cognitive demand required to complete educational tasks. Even though listening and reading (receptive) skills differ from speaking and writing (expressive) skills across proficiency levels the cognitive function should not be diminished. For example, an Entering Level One student only has the linguistic ability to respond in single words in English with significant support from their home language. However, they could complete a Venn diagram with single words which demonstrates that they understand how the elements compare and contrast with each other or they could respond with the support of their home language (L1) with assistance from a teacher, para-professional, peer or a technology program.

http://www.state.nj.us/education/modelcurriculum/ela/ELLOverview.pdf
<table>
<thead>
<tr>
<th>#</th>
<th>Student Learning Objective</th>
<th>NJSLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Find all factor pairs for a whole number up to 100 and determine whether it is a multiple of a given 1-digit whole number and whether it is a prime or composite.</td>
<td>4.OA.B.4*</td>
</tr>
<tr>
<td>2</td>
<td>Generate a number or shape pattern that follows a rule and identify features of the pattern that are not explicit in the rule.</td>
<td>4.OA.C.5</td>
</tr>
<tr>
<td>3</td>
<td>Express measurement in a larger unit in terms of a smaller unit and record equivalent measures in a two-column table.</td>
<td>4.MD.A.1</td>
</tr>
<tr>
<td>4</td>
<td>Write multiplication equations from word problems indicating multiplicative comparisons and describe multiplication equations as comparisons.</td>
<td>4.OA.A.1*</td>
</tr>
<tr>
<td>5</td>
<td>Multiply and divide to solve word problems involving multiplicative comparisons and represent these problems with drawings and equations.</td>
<td>4.OA.A.2</td>
</tr>
<tr>
<td>6</td>
<td>For a whole number up to a million, explain that a digit in one place represents ten times what it would represent in the place to its right.</td>
<td>4.NBT.A.1</td>
</tr>
<tr>
<td>7</td>
<td>Compare two multi-digit whole numbers (up to one million) using &gt;, =, and &lt; for numbers presented at base ten numerals, number names, and/or in expanded form</td>
<td>4.NBT.A.2</td>
</tr>
<tr>
<td>8</td>
<td>Round multi-digit whole numbers up to one million to any place.</td>
<td>4.NBT.A.3</td>
</tr>
</tbody>
</table>

**Instruction:** 8 weeks  
**Assessment:** 1 week
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)
<table>
<thead>
<tr>
<th>Effective Pedagogical Routines/Instructional Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Problem Solving</td>
</tr>
<tr>
<td>Connect Previous Knowledge to New Learning</td>
</tr>
<tr>
<td>Making Thinking Visible</td>
</tr>
<tr>
<td>Develop and Demonstrate Mathematical Practices</td>
</tr>
<tr>
<td>Inquiry-Oriented and Exploratory Approach</td>
</tr>
<tr>
<td>Multiple Solution Paths and Strategies</td>
</tr>
<tr>
<td>Use of Multiple Representations</td>
</tr>
<tr>
<td>Explain the Rationale of your Math Work</td>
</tr>
<tr>
<td>Quick Writes</td>
</tr>
<tr>
<td>Pair/Trio Sharing</td>
</tr>
<tr>
<td>Turn and Talk</td>
</tr>
<tr>
<td>Charting</td>
</tr>
<tr>
<td>Gallery Walks</td>
</tr>
<tr>
<td>Small Group and Whole Class Discussions</td>
</tr>
<tr>
<td>Student Modeling</td>
</tr>
<tr>
<td>Analyze Student Work</td>
</tr>
<tr>
<td>Identify Student’s Mathematical Understanding</td>
</tr>
<tr>
<td>Identify Student’s Mathematical Misunderstandings</td>
</tr>
<tr>
<td>Interviews</td>
</tr>
<tr>
<td>Role Playing</td>
</tr>
<tr>
<td>Diagrams, Charts, Tables, and Graphs</td>
</tr>
<tr>
<td>Anticipate Likely and Possible Student Responses</td>
</tr>
<tr>
<td>Collect Different Student Approaches</td>
</tr>
<tr>
<td>Multiple Response Strategies</td>
</tr>
<tr>
<td>Asking Assessing and Advancing Questions</td>
</tr>
<tr>
<td>Revoicing</td>
</tr>
<tr>
<td>Marking</td>
</tr>
<tr>
<td>Recapping</td>
</tr>
<tr>
<td>Challenging</td>
</tr>
<tr>
<td>Pressing for Accuracy and Reasoning</td>
</tr>
<tr>
<td>Maintain the Cognitive Demand</td>
</tr>
</tbody>
</table>
## Educational Technology

### Standards

<table>
<thead>
<tr>
<th>8.1.5.A.2, 8.1.5.A.3, 8.1.5.F.1, 8.2.5.A.1</th>
</tr>
</thead>
</table>

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

  **Example:** Microsoft Word can be utilized to demonstrate the comparison of large numbers in a context, such as population of states, and include images of the states and utilize mathematical comparison symbols.

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

  **Example:** Students can create and input data into digital graphic organizers to compare and generate patterns noticed. The data can be specific to current events such as elections. [https://creately.com](https://creately.com)

- **Digital Citizenship**
  - Apply digital tools to collect, organize, and analyze data that support a scientific finding.

  **Example:** Microsoft Excel can be utilized to create a spreadsheet that analyzes how much weight a bridge could hold. The measurements of weight can be converted from grams to kilograms and pounds to tons.

- **The Nature of Technology: Creativity and Innovation**
  - Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.

  **Example:** The class will research the production of food grown in nature and foods that are created in factories. They will compare profit, write multiplicative comparisons, and describe the equations.
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. Place value charts can be used to compare, round, and explain digit place value in this unit.

- **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, multiplicative comparisons are represented with the use of drawings and equations.

- **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.

  **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 analyze word problems to determine multiplication equations and multiplicative comparisons that are required to solve.
Career Ready Practices

- **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 listen and construct explanations about the place value of digits and equations created to demonstrate multiplicative comparison.
WIDA Proficiency Levels

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

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

To Increase Comprehension and Communication Skills

## Environment

- Welcoming and stress-free
- Respectful of linguistic and cultural diversity
- Honors students' background knowledge
- Sets clear and high expectations
- Includes routines and norms
- Is thinking-focused vs. answer-seeking
- Offers multiple modalities to engage in content learning and to demonstrate understanding
- Includes explicit instruction of specific language targets
- Provides participation techniques to include all learners

- Integrates learning centers and games in a meaningful way
- Provides opportunities to practice and refine receptive and productive skills in English as a new language
- Integrates 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

---

# 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 help 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 help students question and unpack biases & stereotypes.
- This unit / lesson help students examine, research and question information and sources.
- The curriculum encourage 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.

---

## Culturally Relevant Pedagogy Examples

- **Present new concepts using student vocabulary.** Use student diction to capture attention and build understanding before using academic terms.  
  **Example:** Teach math vocabulary in various modalities for students to remember. Use multi-modal activities, analogies, realia, visual cues, graphic representations, gestures, pictures, practice and cognates. Model to students that some vocabulary has multiple meanings. Have students create the Word Wall with their definitions and examples of vocabulary from this unit to foster ownership.

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

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

<table>
<thead>
<tr>
<th>Assistive Technology</th>
<th>Tests/Quizzes/Grading</th>
<th>Behavior/Attention</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer/whiteboard</td>
<td>• Extended time</td>
<td>• Consistent daily structured routine</td>
<td>• Individual daily planner</td>
</tr>
<tr>
<td>• Tape recorder</td>
<td>• Study guides</td>
<td>• Simple and clear classroom rules</td>
<td>• Display a written agenda</td>
</tr>
<tr>
<td>• Video Tape</td>
<td>• Shortened tests</td>
<td>• Frequent feedback</td>
<td>• Note-taking assistance</td>
</tr>
<tr>
<td></td>
<td>• Read directions aloud</td>
<td></td>
<td>• Color code materials</td>
</tr>
</tbody>
</table>
### Differentiated Instruction

#### Accommodate Based on Content Specific Needs:

- 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.
- Utilize an input/ output table to demonstrate number patterns and conversion of measurements.
- Multiplication chart to reference math facts when writing multiplicative comparisons
- Place value to compare multi-digit whole numbers
- Utilize technological programs which provide verbal and visual instruction in native and/or second language.
- Use interactive technology to improve multiplication fact fluency and accuracy.
- Number lines to improve visualization of rounding
- Base ten blocks
- Pattern blocks to visualize and interpret patterns
## Interdisciplinary Connections

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

### Social Studies Connection:

**Sieves of Eratosthenes: 6.1.4.A.14**

- Students will learn to identify prime numbers using the Sieve of Eratosthenes. They will also study how the sieve was discovered and about Eratosthenes, the Greek mathematician who was responsible for the sieve. See more about the incredible things that Eratosthenes did at: [http://www.socialstudiesforkids.com/www/world/eratosthenesdef.htm](http://www.socialstudiesforkids.com/www/world/eratosthenesdef.htm) and [http://encyclopedia.kids.net.au/page/er/Eratosthenes](http://encyclopedia.kids.net.au/page/er/Eratosthenes)

### Take a Stand: 6.1.4.A.4, 6.1.4.A.7, 6.1.4.A.8

- The teacher takes the role of a judge and presents students with a mathematical statement. Students must then defend their responses as they agree or disagree, but follow courtroom rules as they are presenting their ideas. The task includes the rules of the “courtroom” that are given by the judge.

### Science Connection:

**Cicadas Brood X: 4-LS1-2**

- Students will review and learn about cicadas found in North America that emerge from the ground every 17 years. These cicadas are called Magicicada Septendecim. They will discuss the life cycle of an insect and the predators that an insect has. Learn more information about cicadas at: [http://bugfacts.net/cicada.php](http://bugfacts.net/cicada.php) and [http://www.cicadamania.com/](http://www.cicadamania.com/)
**Science Connection (Cont’d):**

*Earth Day Project: 2-LS2-1*

- Students will learn about recycling and Earth Day. They will discuss different ways to recycle and activities that can be done for Earth Day. Learn more information about recycling and Earth Day at: [http://www.earthday.org/](http://www.earthday.org/) or choose a video to watch at [http://www.bing.com/videos/search?q=earth+day&qpvt=earth+day&FORM=VDRE](http://www.bing.com/videos/search?q=earth+day&qpvt=earth+day&FORM=VDRE)
# 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.OA.B.4
Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.

#### 4.OA.C.5
Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*

#### 4.MD.A.1
Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb., oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft. is 12 times as long as 1 in. Express the length of a 4 ft. snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

#### 4.OA.A.1
Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

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

#### 4.NBT.A.1
Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*

#### 4.NBT.A.2
Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.

#### 4.NBT.A.3
Use place value understanding to round multi-digit whole numbers to any place.
<table>
<thead>
<tr>
<th>Mathematical Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Make sense of problems and persevere in solving them.</td>
</tr>
<tr>
<td><strong>2.</strong> Reason abstractly and quantitatively.</td>
</tr>
<tr>
<td><strong>3.</strong> Construct viable arguments and critique the reasoning of others.</td>
</tr>
<tr>
<td><strong>4.</strong> Model with mathematics.</td>
</tr>
<tr>
<td><strong>5.</strong> Use appropriate tools strategically.</td>
</tr>
<tr>
<td><strong>6.</strong> Attend to precision.</td>
</tr>
<tr>
<td><strong>7.</strong> Look for and make use of structure.</td>
</tr>
<tr>
<td><strong>8.</strong> Look for and express regularity in repeated reasoning.</td>
</tr>
</tbody>
</table>
**NJSLS:**
4.OA.B.4, 4.OA.C.5, 4.MD.A.1, 4.OA.A.1, 4.OA.A.2, 4.NBT.A.1, 4.NBT.A.2, 4.NBT.A.3

**Unit Focus:**
- Gain familiarity with factors and multiples
- Generate and analyze patterns
- Solve problems involving measurement and conversion of measurements
- Use the four operations with whole numbers to solve problems
- Generalize place value understanding for multi-digit whole numbers

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

**Student Learning Objective 1:** Find all factor pairs for a whole number up to 100 and determine whether it is a multiple of a given 1-digit whole number and whether it is a prime or composite.

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

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>4.OA.4-2</td>
<td>Investigate whether numbers are either prime or composite by building rectangles (arrays) with the given area and finding which numbers have more than two rectangles. A whole number is a multiple of each of its factors. Prime numbers do not have factors other than 1 and the number itself.</td>
<td>A prime number is a number greater than 1 that has only 2 factors, 1 and itself. Composite numbers have more than 2 factors and can be decomposed into prime numbers.</td>
<td>Investigating Prime and Composite</td>
</tr>
<tr>
<td>MP 7</td>
<td>4.OA.4-2</td>
<td></td>
<td></td>
<td>Sieve of Eratosthenes</td>
</tr>
<tr>
<td>MP 8</td>
<td>4.OA.4-3</td>
<td></td>
<td></td>
<td>Cicadas Brood X</td>
</tr>
<tr>
<td></td>
<td>4.OA.4-4</td>
<td></td>
<td></td>
<td>Factor Findings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Finding Multiples</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Given a 1-digit number, determine whether a given whole number (between 1 and 100) is a multiple of that one-digit number.</td>
<td>Determine whether a given whole number (between 1 and 100) is prime or composite.</td>
<td>Find all factor pairs for any whole number (between 1 and 100).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiples can be thought of as the result of skip counting by each of the factors.</td>
<td>Determine whether larger numbers always have more factors.</td>
<td>Divisibility rules can be used to determine if a number between 1-100 is a multiple of a given one-digit number. For example, all even numbers are multiples of 2, all even numbers that can be halved twice (with a whole number result) are multiples of 4, and all numbers ending in 0 or 5 are multiples of 5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPED Strategies:</strong> Explain how to determine whether a given whole number in the range 1–100 is prime or composite using key, technical vocabulary in simple sentences.</td>
<td>What is the difference between a prime and composite number and why do we need to know?</td>
<td>The number 1 is neither prime nor composite.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The number 2 is the only even prime number.</td>
<td>The number 2 is the only even prime number.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Numbers are classified according to their factors.</td>
<td>Numbers are classified according to their factors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The determination of prime or composite is unrelated to the size of the number.</td>
<td>The determination of prime or composite is unrelated to the size of the number.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Ride on the Bus</td>
<td>Arranging Chairs</td>
<td>Tiling the Patio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifying Multiples</td>
<td><strong>Additional Activities:</strong> Prime Number Hunt</td>
<td>Prime or Composite?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sequence the steps needed to find all factor pairs for a whole number up to 100 and determine whether it is a multiple of a given 1-digit whole number using key, technical vocabulary in simple sentences.

Provide mental imagery for mathematical idea.

**ELL Strategies:**
Explain how to determine whether a given whole number in the range 1–100 is prime or composite in L1 (student’s native language) and/or use gestures, examples, and selected, technical words

Sequence the steps needed to find all factor pairs for a whole number up to 100 and determine whether it is a multiple of a given 1-digit whole number in L1 (student’s native language) and/or use gestures, examples, and selected, technical words.
New Jersey Student Learning Standard:
4.OA.C.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

Student Learning Objective 2: Generate a number or shape pattern that follows a rule and identify features of the pattern that are not explicit in the rule.

Modified Student Learning Objectives/Standards:
M.EE.4.OA.C.5: Use repeating patterns to make predictions.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/ Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/ Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 8</td>
<td>4.OA.5</td>
<td>Create rules that patterns follow by using a t-chart or visual representation. Numerical patterns allow students to reinforce facts and develop fluency with operations. Patterns and rules are related. A pattern is a sequence that repeats the same process over and over. A rule dictates what that process will look like. Investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features. Describe features of an arithmetic number pattern or shape pattern by identifying the rule and features that are not explicit in the rule.</td>
<td>How do we find a rule for a specific number or shape pattern? A pattern may be described in more than one way. Some sequences of geometric objects change in predictable ways, that same process over and over. A rule dictates what that process will look like. Investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features.</td>
<td>Earth Day Project Piles of Orange Table Dilemma Arranging Tables Lawn Mowing Business Double Plus One</td>
</tr>
<tr>
<td>Analyze a sequence of numbers in order to identify features that are not explicitly stated in the rule.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPED Strategies:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review identifying simple types of patterns by using manipulatives.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide manipulatives for students to physically model the pattern.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extend a repeating pattern by giving a model, or example.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe and explain orally and in writing how to generate number or shape patterns using key, technical vocabulary in simple sentences.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ELL Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe and explain orally and in writing how to generate number or shape patterns in L1 (student’s native language) and/or use gestures, examples, and selected, technical words.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review identifying simple types of patterns by using manipulatives.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
New Jersey Student Learning Standard:
4.MD.A.1: Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb., oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft. is 12 times as long as 1 in. Express the length of a 4 ft. snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...

Student Learning Objective 3: Express measurement in a larger unit in terms of a smaller unit and record equivalent measures in a two-column table.

Modified Student Learning Objectives/Standards:
4.EE.4.MD.A.1: Identify the smaller measurement unit that comprises a larger unit within a measurement system (inches/foot, centimeter/meter, and minutes/hour).

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/ Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/ Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 5 MP 8 | 4.MD.1 | Expressing larger measurements in smaller units within the metric system can reinforce notions of place value. Creating conversion tables can be used to help students become familiar with new units and explore the patterns and relationships between units. It will also assist in recording measurement equivalents. **Example:**

<table>
<thead>
<tr>
<th>ft.</th>
<th>in</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>Larger units can be subdivided into smaller equivalent units (partition).</td>
<td></td>
</tr>
<tr>
<td>What is the relationship between the size of a unit and the size of other units in the same system of measurement?</td>
<td></td>
</tr>
<tr>
<td>How do we change large measurement units into smaller measurement units?</td>
<td></td>
</tr>
<tr>
<td>What is a unit of measurement?</td>
<td></td>
</tr>
<tr>
<td>What can be measured and how?</td>
<td></td>
</tr>
<tr>
<td>Why does one need to measure things?</td>
<td></td>
</tr>
<tr>
<td>Setting the Standards</td>
<td></td>
</tr>
<tr>
<td>Measuring the Jump Rope</td>
<td></td>
</tr>
<tr>
<td>Off to the Races</td>
<td></td>
</tr>
<tr>
<td>Making Punch</td>
<td></td>
</tr>
<tr>
<td>Who is the Tallest?</td>
<td></td>
</tr>
<tr>
<td>Multiplication (base ten system) can be used to convert larger units of measure to smaller units of measure.</td>
<td></td>
</tr>
<tr>
<td>Relationships to measurement units can be expressed as functions.</td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong> 12 inches = 1 foot or 1 foot = 12 inches.</td>
<td></td>
</tr>
<tr>
<td>Provide contextualized examples that provide the opportunity to choose appropriate measurement.</td>
<td></td>
</tr>
<tr>
<td>Relative sizes of measurements (e.g. a kilometer is 1000 times as long as a meter and 100,000 times as long as a centimeter).</td>
<td></td>
</tr>
<tr>
<td><strong>SPED Strategies:</strong> In groups, create examples of standard units of measurements by recording measurements of manipulatives onto an anchor chart.</td>
<td></td>
</tr>
<tr>
<td>Utilize measuring tools such as yardsticks (meter sticks) and rulers (marked with customary and metric units), teaspoons and tablespoons, and graduated measuring cups (marked with customary and metric units).</td>
<td></td>
</tr>
<tr>
<td><strong>ELL Strategies:</strong> Review identifying simple types of patterns by using manipulatives, such as pattern blocks.</td>
<td></td>
</tr>
<tr>
<td>The smaller the unit used to measure the distance is, the more of those units that will be needed (compensatory principal).</td>
<td></td>
</tr>
</tbody>
</table>
New Jersey Student Learning Standard:
4.OA.A.1: Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

Student Learning Objective 4: Write multiplication equations from word problems indicating multiplicative comparisons and describe multiplication equations as comparisons.

Modified Student Learning Objectives/Standards:
M.EE.4.OA.A.1-2: Demonstrate the connection between repeated addition and multiplication.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>4.OA.1-1</td>
<td>Utilize the properties and patterns of multiplication (including the commutative, associative, and identity properties).</td>
<td>How can we determine the relationships between numbers?</td>
<td>IFL Task(s) – “Exploration of Multiplicative Comparisons and the Link to Division”</td>
</tr>
<tr>
<td>MP 4</td>
<td>4.OA.1-2</td>
<td>Identify and verbalize which quantity is being multiplied and which number tells by how many times.</td>
<td>How can we use a pattern to identify multiplicative comparisons?</td>
<td>IFL PBA Tasks: Comparing Reading Books Task</td>
</tr>
<tr>
<td></td>
<td>• Tasks have “thin context” or no context.</td>
<td>Explore the meaning of the two factors in comparison multiplication problems.</td>
<td>One of the factors in multiplication indicates the number of objects in a group and the other factor indicates the number of groups.</td>
<td>Redwood Tree Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practice writing and identifying equations and statements for multiplicative comparisons.</td>
<td>In the multiplicative expression $A \times B$, $A$ can be defined as a</td>
<td>Additional Tasks: Take a Stand</td>
</tr>
</tbody>
</table>
Use manipulatives to represent how many times greater the area of one shape is than another, such as pattern blocks.

Provide contextualized situations which make use of diagrams, a table, and equations.

**Example:**
There were thirty-two adults and four children in line at a movie theater. How many times more adults were in the line than children?

Utilize multiplicative thinking, known multiples, and the meaning of each factor/product.

Interpret diagrams that focus on unmeasured multiplicative relationships.

Explain multiplication equations to represent comparisons.

Promote words like “doubling” and “tripling” to connect to “two times as much” and “three times as much” to introduce multiplicative relationships.

Distinguish multiplicative comparison from the additive comparison.

Write multiplication equations given word problems indicating multiplicative comparison.
<table>
<thead>
<tr>
<th><strong>SPED Strategies:</strong></th>
<th></th>
</tr>
</thead>
</table>
| Review multiplication facts 0-12  
Drawing pictures or using models will help students understand what the problem is asking. They should check the reasonableness of their answer using mental computation and estimation strategies.  
Solve problems using repeated addition. |  |

<table>
<thead>
<tr>
<th><strong>ELL Strategies:</strong></th>
<th></th>
</tr>
</thead>
</table>
| Represent verbal statements of multiplicative comparisons as multiplication equations and interpret written comparisons by completing an equation in L1 (student’s native language) and/or use gestures, drawings and selected technical words.  
Drawing pictures or using models will help students understand what the problem is asking. They should check the reasonableness of their answer using mental computation and estimation strategies.  
Review place value concepts to build background knowledge. |  |
New Jersey Student Learning Standard:
4.OA.A.2: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

Student Learning Objective 5: Multiply and divide to solve word problems involving multiplicative comparisons and represent these problems with drawings and equations.

Modified Student Learning Objectives/Standards:
M.EE.4.OA.A.1-2: Demonstrate the connection between repeated addition and multiplication.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 1</td>
<td></td>
<td>Identify when multiplication or division must be used in a multiplicative comparison question. For example, when “5 times more” indicates multiplication and “5 times less” indicates division.</td>
<td>How can we use patterns to solve problem?</td>
<td>IFL Task(s) – “Exploration of Multiplicative Comparisons and the Link to Division”</td>
</tr>
<tr>
<td>MP 4</td>
<td></td>
<td>Identify what amount would be added to or subtracted from one quantity in order to result in the other.</td>
<td>Unfamiliar multiplication problems may be solved by using known multiplication facts and properties of multiplication.</td>
<td>IFL PBA Tasks: Comparing Reading Books Task</td>
</tr>
<tr>
<td>MP 5</td>
<td></td>
<td>Recognize the inverse relationship between multiplication and division, and determine that division can be used to solve comparison multiplication problems when either group size or the scaling factor is provided.</td>
<td>Multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times larger or smaller than the other.</td>
<td>Redwood Tree Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tape diagrams can be used as a strategy in solving problems with multiplicative comparisons.</td>
<td>What is the meaning of each of the factors in comparison multiplication problems?</td>
<td>Additional Tasks: Bikes and Trikes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In a comparative relationship, there is an amount that is constant and other amounts are compared to it.</td>
<td>Cars on a Ramp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gourmet Candy Packaging (Task B and C)</td>
</tr>
</tbody>
</table>
Use pattern blocks, counters, tables, diagrams, equations, and number lines to show repeated relationship in multiplication.

**Example:**
5x = 30

\[ \begin{align*}
0 & \quad 6 & \quad 12 & \quad 18 & \quad 24 & \quad 30 \\
\end{align*} \]

Students use a diagram to represent the constant and create a scaled diagram.

There are three kinds of multiplicative comparison word problems:

**Product unknown comparisons.** For example, “A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?”

**Set size unknown comparisons.** For example, “A boy has $12 and each red hat costs $3. How many hats can the boy buy?”

A multiplicative comparison involves a constant increase that is x more times or x times less; whereas an additive comparison only involves determining how many more than or how many less than another set.

In the multiplicative expression A x B, A can be defined as a scaling factor. (NCTM, Essential Understanding, 2011).

A situation that can be represented by multiplication has an element that represents the scalar and an element that represents the quantity to which the scalar applies. (NCTM, Essential Understanding, 2011)

Multiplicative comparisons involve three aspects: groups of equal size (a multiplicand), numbers of groups (the multiplier), and a total amount (the product).

**Selling Candy**

**Comparing Money Raised**
Multiplier unknown comparisons. For example, “A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat?”

Diagrams, tables, and number lines can be used as strategies in solving problems with multiplicative comparisons.

Students should be able to distinguish multiplicative comparison from additive comparisons.

Assess students’ interpretations of a model to determine whether their view demonstrates mathematical understanding.

Translate comparative situations into equations.

Represent problems with drawings and equations, using a symbol for the unknown number.

Find evidence in a word problem to help develop an equation and support the operation chosen to solve.
<table>
<thead>
<tr>
<th><strong>SPED Strategies:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use arrays to show multiplication concepts.</td>
<td></td>
</tr>
<tr>
<td>Review multiplication facts and provide chart as needed.</td>
<td></td>
</tr>
<tr>
<td>Provide students with calculators or multiplication facts table.</td>
<td></td>
</tr>
<tr>
<td>Solve orally and in writing word problems involving multiplicative comparison using key technical vocabulary in a series of simple sentences.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ELL Strategies:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Review multiplication facts and provide multiplication table as needed.</td>
<td></td>
</tr>
<tr>
<td>Solve orally and in writing word problems involving multiplicative comparison in L1 (student’s native language) and/or use gestures, examples and selected technical words.</td>
<td></td>
</tr>
</tbody>
</table>
New Jersey Student Learning Standard:
4.NBT.A.1: Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.

Student Learning Objective 6: For a whole number up to a million, explain that a digit in one place represents ten times what it would represent in the place to its right.

Modified Student Learning Objectives/Standards: N/A

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/ Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/ Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 7 | 4.NBT.1 | Gain a conceptual understanding of decomposing numbers which later lead to computation of addition, subtraction, multiplication, and division. Understand the place value structure of the base-ten number system. Identify patterns when dividing or multiplying by 10. Gain a conceptual understanding that the value of each place is 10 times the value of the place to its immediate right. A quantitative relationship exists between the digits in place value positions of a multi-digit number. | The value of a number is determined by the place of its digits. How does our base 10 number system work? What happens to a digit when multiplied and/or divided by 10 or 100? | Relative Values of Places
Coin Collection
Packaging Soup Cans
Value of the Bills
Thousands & Millions of Fourth Graders |

SPED Strategies:
Place value flip charts, color coded place value charts, and number cards can be used.
Explain orally and in writing that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right using key technical vocabulary in a series of simple sentences.

**ELL Strategies:**
Explain orally and in writing that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right using L1 (student’s native language) and/or gestures, examples and selected technical words.

Use of sentence frames and sentence starters.

Place value flip charts, color coded place value charts, and number cards can be used.
New Jersey Student Learning Standard:
4.NBT.A.2: Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Student Learning Objective 7: Compare two multi-digit whole numbers (up to one million) using >, =, and < for numbers presented as base ten numerals, number names, and/or in expanded form.

Modified Student Learning Objectives/Standards:
M.EE.4.NBT.A.2: Compare whole numbers to 10 using symbols (<, >, =).

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/ Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/ Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP 7</td>
<td>4.NBT.2</td>
<td>Become aware of the greatest place value in a number.</td>
<td>What determines the value of a digit?</td>
<td>IFL PBA Tasks: Turning Pages Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop a clear understanding of the value of the digits based on where they are placed in a number.</td>
<td>How can we compare large numbers?</td>
<td>Additional Task: Number Scramble</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eliminate misconception of writing numbers as you hear them, such as writing one thousand two as 1002 by using place value boxes and grid paper.</td>
<td>Why is it important for us to be able to compare numbers?</td>
<td>Ticket Master</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Write and compare numbers in three forms: expanded, word (number names), and standard (base ten numerals).</td>
<td>Whole numbers are read from left to right using the name of the period.</td>
<td>Build a Number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students should be able to compare numbers represented in different ways. For example, compare a number written in expanded form to a number written in number names for example;</td>
<td>Comparison symbols can be used to show relationship between number values.</td>
<td>State Populations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The placement of a digit dictates its value, how it is read, written, and compared.</td>
<td>Arranging Students</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Juicy Pouches</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ordering 4-digit Numbers</td>
</tr>
<tr>
<td>Place commas to identify different periods when reading a number.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use a place value table to recognize the value of each digit in a number and determine if a number is greater or less than another.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A base ten numeral is related to the numeral name and the expanded form.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compare two multi-digit numbers using $&gt;$, $=$, and $&lt;$ symbols.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPED Strategies:**
Provide exemplars on how to compare multi-digit numbers.

Compare two multi-digit whole numbers using greater than, less than or equal to symbols ($>$, $<$, $=$) by recording the results of comparisons using key vocabulary in a series of simple sentences.

Place value flip charts, color coded place value charts, and number cards can be used.

Multiple representations of a whole number exist.
**ELL Strategies:**

Compare two multi-digit whole numbers using greater than, less than or equal to symbols (>, <, =) by recording the results of comparisons in L1 (student’s native language) and/or use gestures, examples and selected technical words.

Provide exemplars of how to compare multi-digit numbers.

Place value flip charts, color coded place value charts, and number cards can be used.

---

**New Jersey Student Learning Standard:**

4.NBT.A.3: Use place value understanding to round multi-digit whole numbers to any place.

**Student Learning Objective 8:** Round multi-digit whole numbers up to one million to any place.

**Modified Student Learning Objectives/Standards:**

M.EE.4.NBT.A.3: Round any whole number 0-30 to the nearest ten.

<table>
<thead>
<tr>
<th>MPs</th>
<th>Evidence Statement Key/ Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/ Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 7  | 4.NBT.3                                 | Use a number line and/or hundreds chart to determine what base ten numbers the number being rounded is closest to. Create rounding rules and utilize number sense to emphasize when the rounded digit rounds up or stays the same. Determine possible range for answer. | Rounding numbers give approximation and not exact. Using rounding is an appropriate estimation strategy for solving problems. | Planning a Pizza Party
Nice Numbers
Open Number Line
Rounding Numbers and Products |

---

Grade 4 expectations are limited to whole numbers less than or equal to 1,000,000.
<table>
<thead>
<tr>
<th>Use anchoring and visualization techniques, such as place value charts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round multi-digit whole numbers, explain the process, and apply to real life situations.</td>
</tr>
<tr>
<td>Rounding numbers should result in using number sense and estimation not just following a rule. This supports students in developing a rule on their own.</td>
</tr>
<tr>
<td>When students are asked to round large numbers, they first need to identify which digit is in the appropriate place.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
</tr>
<tr>
<td>Round 76,398 to the nearest 1000.</td>
</tr>
<tr>
<td>• Step 1: Since I need to round to the nearest 1000, then the answer is either 76,000 or 77,000.</td>
</tr>
<tr>
<td>• Step 2: I know that the halfway point between these two numbers is 76,500.</td>
</tr>
<tr>
<td>• Step 3: I see that 76,398 is between 76,000 and 76,500.</td>
</tr>
<tr>
<td>• Step 4: Therefore, the rounded number would be 76,000.</td>
</tr>
<tr>
<td><strong>SPED Strategies:</strong></td>
</tr>
<tr>
<td>Review by linking to students’ prior knowledge of rounding to the nearest ten(s) and hundred(s) using concrete materials, drawings, and using a number line with drawings.</td>
</tr>
<tr>
<td>How can we use rounding to ensure our answer is reasonable?</td>
</tr>
<tr>
<td>What information is needed in order to round whole numbers to any place value?</td>
</tr>
<tr>
<td><strong>Rounding Numbers and Products 2</strong></td>
</tr>
<tr>
<td><strong>Rounding on the Number Line</strong></td>
</tr>
<tr>
<td>Create interactive notebooks with rules and examples.</td>
</tr>
<tr>
<td>Utilize number lines and color coded place value charts.</td>
</tr>
<tr>
<td>View a video related to rounding numbers.</td>
</tr>
<tr>
<td>Draw pictures to help round to the nearest ten(s) and hundred(s).</td>
</tr>
</tbody>
</table>

**ELL Strategies:**
Review by linking to students’ prior knowledge of rounding to the nearest ten(s) and hundred(s) using concrete materials, and drawings.

| Create interactive notebooks with rules and examples. |
| Utilize number lines and color coded place value charts. |
| View a video related to rounding numbers. |
| Demonstrate understanding of using place value to round multi-digit whole numbers to any place orally and in writing in L1 (student’s native language) and/or use gestures, examples and selected technical words. |
## Integrated Evidence Statements

**4.NBT.Int:** Perform computations by applying conceptual understanding of place value, rather than by applying multi-digit algorithms.
- Tasks do not have a context.

**4.Int.5:** Solve multi-step word problems posed with whole numbers and involving computations best performed by applying conceptual understanding of place value, perhaps involving rounding. **Content Scope:** 4.OA.3, 4.NBT
  - Multi-step problems must have at least 3 steps.
  - Tasks must be aligned to the first standard and 1 or more of the subsequent standards listed in the content scope.

**4.C.3** Reason about the place value system itself. **Content Scope:** Knowledge and skills articulated in 4.NBT.A
  - Tasks have “thin context” or no context

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

**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, p. 93; NJSLS, Table 2, p. 94; and the OA Progression document).
# Unit 1 Vocabulary

- Algorithm
- Associative Property of Multiplication
- Common Factor
- Common Multiple
- Commutative Property of Multiplication
- Compare
- Compatible Numbers
- Composite Number
- Conversion
- Conversion Table
- Customary System
- Distributive Property
- Divisibility Rules
- Divisor
- Dividend
- Equation
- Estimate
- Expanded Form
- Expression
- Fact Family
- Factors
- Factor Pairs
- Foot
- Fluid Ounce
- Gram
- Greatest Common Factor
- Identity Property of Multiplication
- Inch
- Interprett Kilogram
- Kilometer
- Length
- Mass
- Meter
- Metric System
- Measurement
- Mental Math/ Mental Calculation
- Mile
- Millimeter
- Model/ Visual Model
- Multiples
- Ounce
- Partial Product
- Partial Quotient
- Pattern
- Place Value
- Prime Number
- Product
- Quotient
- Reasonableness
- Related Facts
- Remainder
- Rule
- Sequence
- Term
- Variable
- Weight
- Whole Number
- Zero Property of Multiplication
<table>
<thead>
<tr>
<th>References &amp; Suggested Instructional Websites</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.internet4classrooms.com">www.internet4classrooms.com</a></td>
</tr>
<tr>
<td><a href="http://www.k-5mathteachingresources.com/">www.k-5mathteachingresources.com/</a></td>
</tr>
<tr>
<td><a href="http://www.georgiastandards.org/Common-Core/Pages/Math-K-5.aspx">www.georgiastandards.org/Common-Core/Pages/Math-K-5.aspx</a></td>
</tr>
<tr>
<td><a href="http://www.illustrativemathematics.org/">www.illustrativemathematics.org/</a></td>
</tr>
<tr>
<td>mathcommoncoreresources.wikispaces.com/Elementary+Resources</td>
</tr>
<tr>
<td><a href="http://www.sebring.k12.oh.us/userfiles/28/Classes/7664/4th%20Grade%20Common%20Core%20Math%20Vocabulary%20one%20sheet%20for%20notebook-0.pdf">http://www.sebring.k12.oh.us/userfiles/28/Classes/7664/4th%20Grade%20Common%20Core%20Math%20Vocabulary%20one%20sheet%20for%20notebook-0.pdf</a></td>
</tr>
<tr>
<td><a href="http://3-5cctask.ncdpi.wikispaces.net/Fourth+Grade+Tasks">http://3-5cctask.ncdpi.wikispaces.net/Fourth+Grade+Tasks</a></td>
</tr>
<tr>
<td><a href="http://www.katm.org/flipbooks/4%20FlipBook%20Final%20CCSS%202014.pdf">http://www.katm.org/flipbooks/4%20FlipBook%20Final%20CCSS%202014.pdf</a></td>
</tr>
<tr>
<td><a href="http://ccak52012.wikispaces.com/">http://ccak52012.wikispaces.com/</a></td>
</tr>
<tr>
<td><a href="http://www.sheppardsoftware.com/">http://www.sheppardsoftware.com/</a></td>
</tr>
</tbody>
</table>
# 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.  

**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.  

**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.  
[https://lsc.org/](https://lsc.org/)

**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.  

**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.  
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/