Grade 6: Unit 2
Expressions and 3-D Geometry
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.

Sixth Grade Mathematics consists of the following domains: Ratios and Proportional Relationships (RP), The Number System (NS), Expressions and Equations (EE), Geometry (G), and Statistics and Probability (SP). In sixth grade, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

1) Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.

2) Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.

3) Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities.

4) Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability.
Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected. Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.
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
# Pacing Chart – Unit 2

<table>
<thead>
<tr>
<th>#</th>
<th>Student Learning Objective</th>
<th>NJSLS</th>
<th>Instruction: 8 weeks</th>
<th>Assessment:  1 week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Write and evaluate numerical expressions involving whole number exponents.</td>
<td>6.EE.A.1</td>
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<tr>
<td>2</td>
<td>Use mathematical language to identify parts of an expression.</td>
<td>6.EE.A.2b</td>
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<tr>
<td>3</td>
<td>Write and evaluate algebraic expressions involving exponents (include evaluating formulas).</td>
<td>6.EE.A.2a, c</td>
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<tr>
<td>4</td>
<td>Apply properties of operations (factor, distribute, and combine like terms) to generate equivalent expressions and to identify when two expressions are equivalent.</td>
<td>6.EE.A.3</td>
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<td>6.EE.A.4</td>
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<tr>
<td>5</td>
<td>Use variables to represent numbers and write expressions when solving real world or mathematical problems.</td>
<td>6.EE.B.6</td>
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<tr>
<td>6</td>
<td>Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes and show that the volume is the same as it would be if found by multiplying the edge lengths; apply volume formulas to right rectangular prisms with fractional edge lengths.</td>
<td>6.G.A.2</td>
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<tr>
<td>7</td>
<td>Represent three dimensional figures objects with nets made of rectangles and triangles, and use the nets to find the surface area of the figures in order to solve real world and mathematical problems.</td>
<td>6.G.A.4</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 stagnant field of textbook problems; rather, it is a dynamic way of constructing meaning about the world around us, generating knowledge and understanding about the real world every day. Students should be metaphorically rolling up their sleeves and “doing mathematics” themselves, not watching others do mathematics for them or in front of them. (Protheroe, 2007)

Balanced Mathematics Instructional Model

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

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

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

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

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>
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<tr>
<th>Effective Pedagogical Routines/Instructional Strategies</th>
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<td>Collaborative Problem Solving</td>
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<tr>
<td>Connect Previous Knowledge to New Learning</td>
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<td>Making Thinking Visible</td>
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<tr>
<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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<tr>
<td>Use of Multiple Representations</td>
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<td>Explain the Rationale of your Math Work</td>
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<td>Quick Writes</td>
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<td>Pair/Trio Sharing</td>
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<td>Turn and Talk</td>
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<td>Charting</td>
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<td>Gallery Walks</td>
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<td>Small Group and Whole Class Discussions</td>
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<td>Student Modeling</td>
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<tr>
<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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<tr>
<td>Interviews</td>
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<tr>
<td>Role Playing</td>
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<tr>
<td>Diagrams, Charts, Tables, and Graphs</td>
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<tr>
<td>Anticipate Likely and Possible Student Responses</td>
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<td>Collect Different Student Approaches</td>
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<td>Multiple Response Strategies</td>
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<td>Asking Assessing and Advancing Questions</td>
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<td>Revoicing</td>
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<td>Marking</td>
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<tr>
<td>Recapping</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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</table>
## Educational Technology Standards

**8.1.8.A.1, 8.1.8.A.3, 8.1.8.E.1, 8.2.8.C.5.a**

### Technology Operations and Concepts
- **Demonstrate knowledge of a real world problem using digital tools**
  
  **Example:** Students can play [http://www.math-play.com/Algebraic-Expressions-Millionaire/algebraic-expressions-millionaire.html](http://www.math-play.com/Algebraic-Expressions-Millionaire/algebraic-expressions-millionaire.html) to reinforce their skills on expressions.

- **Use and/or develop a simulation that provides an environment to solve a real world problem or theory.**
  
  **Example:** Students can use [https://www.learner.org/interactives/geometry/area_volume.html](https://www.learner.org/interactives/geometry/area_volume.html) to fill a prism with 3D blocks to help determine the volume.

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

### Design
- **Create a technical sketch of a product with materials and measurements labeled.**
  
  **Example:** Students can create nets on a word document using the shapes provided in the tool bar.
Career Ready Practices

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

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

  **Example:** Students will apply prior knowledge when solving real world problems. Students will make sound judgements about the use of specific tools, such as unit cubes and use the tools to explore and deepen the understanding of the volume of a right rectangular prism.

- **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 on a daily basis will communicate their reasoning behind their solution paths by making connections to the context and the quantities, using proper vocabulary, along with decontextualizing and/or contextualizing the problem. Students will create representations using objects, drawings, diagrams, and/or actions, such as drawing nets of three-dimensional figures. They will also explain the meaning behind the quantities and units involved. Students will also ask probing questions to clarify and improve arguments.

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

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

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

  **Example:** Students will work in collaborative and whole group settings to develop various solutions to math tasks that are presented to them. They will work together to understand the terms of the problem, ask clarifying and challenging questions among each other, and develop agreed upon solutions using a variety of strategies and models. Students will listen to, read and discuss arguments with each other with respect and courtesy at all times and will be willing to assist those that may need assistance. In this unit, students will demonstrate and explain to a peer or small group how to use the nets to find the surface area of the figures in order to solve real world and mathematical problems.
## 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>Language Proficiency</th>
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</table>
| 6- Reaching | - Specialized or technical language reflective of the content areas at grade level  
- A variety of sentence lengths of varying linguistic complexity in extended oral or written discourse as required by the specified grade level  
- Oral or written communication in English comparable to proficient English peers |
| 5- Bridging | - Specialized or technical language of the content areas  
- A variety of sentence lengths of varying linguistic complexity in extended oral or written discourse, including stories, essays or reports  
- Oral or written language approaching comparability to that of proficient English peers when presented with grade level material. |
| 4- Expanding | - Specific and some technical language of the content areas  
- A variety of sentence lengths of varying linguistic complexity in oral discourse or multiple, related sentences or paragraphs  
- Oral or written language with minimal phonological, syntactic or semantic errors that may impede the communication, but retain much of its meaning, when presented with oral or written connected discourse, with sensory, graphic or interactive support |
| 3- Developing | - General and some specific language of the content areas  
- Expanded sentences in oral interaction or written paragraphs  
- Oral or written language with phonological, syntactic or semantic errors that may impede the communication, but retain much of its meaning, when presented with oral or written, narrative or expository descriptions with sensory, graphic or interactive support |
| 2- Beginning | - General language related to the content area  
- Phrases or short sentences  
- Oral or written language with phonological, syntactic, or semantic errors that often impede of the communication when presented with one to multiple-step commands, directions, or a series of statements with sensory, graphic or interactive support |
| 1- Entering | - Pictorial or graphic representation of the language of the content areas  
- Words, phrases or chunks of language when presented with one-step commands directions, WH-, choice or yes/no questions, or statements with sensory, graphic or interactive support |
Language Development Supports For English Language Learners
To Increase Comprehension and Communication Skills

Environment
- Welcoming and stress-free
- Respectful of linguistic and cultural diversity
- Honors students' background knowledge
- Sets clear and high expectations
- Includes routines and norms
- Is thinking-focused vs. answer-seeking
- Offers multiple modalities to engage in content learning and to demonstrate understanding
- Includes explicit instruction of specific language targets
- Provides participation techniques to include all learners
- Integrates learning centers and games in a meaningful way
- Provides opportunities to practice and refine receptive and productive skills in English as a new language
- Integrates 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?

<table>
<thead>
<tr>
<th>CONTENT INTEGRATION</th>
<th>KNOWLEDGE CONSTRUCTION</th>
<th>PREJUDICE REDUCTION</th>
<th>EQUITABLE PEDAGOGY</th>
<th>EMPOWERING SCHOOL CULTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers use examples and content from a variety of cultures &amp; groups.</td>
<td>Teachers help students understand how knowledge is created and influenced by cultural assumptions, perspectives &amp; biases.</td>
<td>Teachers implement lessons and activities to assert positive images of ethnic groups &amp; improve intergroup relations.</td>
<td>Teachers modify techniques and methods to facilitate the academic achievement of students from diverse backgrounds.</td>
<td>Using the other four dimensions to create a safe and healthy educational environment for all.</td>
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</tbody>
</table>

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.

This unit / lesson provides context to the history of privilege and oppression.

This unit / lesson addresses power relationships.

This unit / lesson helps students develop research and critical thinking skills.

This curriculum creates windows and mirrors* for students.

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.

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.

There are opportunities for students to connect with the community.

My classroom is welcoming and supportive for all students?

I am aware of and sensitive to the needs of my students and their families.

There are effective parent communication systems established. Parents can talk to me about issues as they arise in my classroom.

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### Culturally Relevant Pedagogy Examples

- **Problem-Based Learning Scenarios:** Present relatable real-world problems for your students to solve, explicitly referencing cultures and communities when applicable.
  
  **Example:** Ask the students to bring in an empty box of their favorite cereal. The students will then use a ruler to measure the edges of the box and use the formula \((L \times W \times H)\) to determine the volume. Ask the students to then change the dimensions of the box to maintain the same volume and draw their new boxes. Have students discuss their new designs.

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

- **Everyone has a Voice:** Create a classroom environment where students know that their contributions are expected and valued.
  
  **Example:** Establish norms for sharing that promote discourse and 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.

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

### Accommodate Based on Students' Individual Needs: Strategies

<table>
<thead>
<tr>
<th>Time/General</th>
<th>Processing</th>
<th>Comprehension</th>
<th>Recall</th>
<th>Assistive Technology</th>
<th>Tests/Quizzes/Grading</th>
<th>Behavior/Attention</th>
<th>Organization</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>
<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>Adjust length of assignment</td>
<td>Have students verbalize steps</td>
<td>Short manageable tasks</td>
<td>Use visual graphic organizers</td>
<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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<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>
<td>Video Tape</td>
<td>Shortened tests</td>
<td>Provide immediate feedback</td>
<td>Note-taking assistance</td>
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<tr>
<td>Communication system between home and school</td>
<td>Mini-breaks between tasks</td>
<td>Provide a warning for transitions</td>
<td>Visual and verbal reminders</td>
<td></td>
<td>Provide lecture notes/outline</td>
<td>Small group instruction</td>
<td>Color code materials</td>
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<td>Provide lecture notes/outline</td>
<td>Partnering</td>
<td>Emphasize multi-sensory learning</td>
<td>Graphic organizers</td>
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<td>Read directions aloud</td>
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<td>Differentiated Instruction</td>
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<tr>
<td>Accommodate Based on Content Specific Needs: Strategies</td>
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- Anchor charts to model strategies and use of formulas
- Reference sheets that list formulas, step-by-step procedures and model strategies
- Conceptual word wall that contains definition, translation, pictures and/or examples
- Graphic organizers (Examples include: Venn diagram, Four Square, K-W-L)
- Translation dictionary
- Teacher modeling
- Four-function calculator to assist with computations
- Students can utilize math journals to write notes, copy solution steps, and translate terms and key vocabulary
- Highlight and label the solution steps for multi-step problems in different colors
- Utilize technological programs which provide verbal and visual instruction in native and/or second language
- Provide review of Commutative and Associative Properties of Multiplication and Addition
- Review use of area models for Distributive Property
- Use of algebra tiles to assist with combining like terms
- Use of unit cubes to find the volume of a right rectangular prism
- Models of three-dimensional objects that can be unfolded into nets
- Tangrams or two-dimensional shapes to form nets
Interdisciplinary Connections

Model interdisciplinary thinking to expose students to other disciplines.

Home Economics Connection:
*Banana Bread:* (CRP1, CRP2, CRP3, CRP6, CRP8, CRP12)
- Bring in a recipe for banana bread and discuss how to read the recipe. The recipe can be handed out if the students would like to make it at home.

Life Skills Connection:
*Grocery Shopping* (CRP3, CRP2, CRP8, CRP10)
- Incorporate discussions how creating food lists, comparing prices at stores, and how much of each item you need to buy.

Social Studies Connection:
*Firefighter Allocation:* (6.1.4.C.2)
- The task can be extended and students can research the budget of their city and determine how particular funds can be allocated.

ELA Connection:
*Various Tasks:* (RL.6.1 & RI.6.1)
- Students will be able to read, analyze, and cite informational text to solve problems and explain their reasoning of how the task was solved. Students will also focus on vocabulary, mechanics and grammar in effective writing.
Enrichment

What is the purpose of Enrichment?

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

Enrichment is…

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

Enrichment is not…

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

**Required District/State Assessments**
- Unit Assessments
- PARCC
- SGO Assessments

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

6.EE.A.1. Write and evaluate numerical expressions involving whole-number exponents.

6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers.
   6.EE.A.2a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract y from 5" as 5 - y.
   6.EE.A.2b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.
   6.EE.A.2c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s^3 and A = 6s^2 to find the volume and surface area of a cube with sides of length s = ½.

6.EE.A.3. Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.

6.EE.A.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
   For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.

6.EE.B.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6.G.A.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = B h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

6.G.A.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
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: Six | Unit: 2 (Two) | Topic: Expressions and 3-D Geometry

**NJSLS:** 6.EE.A.1, 6.EE.A.2a, b, c, 6.EE.A.3, 6.EE.A.4, 6.EE.B.6, 6.G.A.2, 6.G.A.4

**Unit Focus:**
- Apply and extend previous understandings of arithmetic to algebraic expressions
- Reason about and solve one-variable equations and inequalities
- Solve real-world and mathematical problems involving area, surface area, and volume

**New Jersey Student Learning Standard(s):**
6.EE.A.1 Write and evaluate numerical expressions involving whole-number exponents

**Student Learning Objective 1:** Write and evaluate numerical expressions involving whole number exponents.

**Modified Student Learning Objectives/Standards:**
M.EE.6.EE.A.1–2: Identify equivalent number sentences.

<table>
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<tr>
<th>MPs</th>
<th>Evidence Statement Key/ Clarifications</th>
<th>Skills, Strategies &amp; Concepts</th>
<th>Essential Understandings/ Questions (Accountable Talk)</th>
<th>Tasks/Activities</th>
</tr>
</thead>
</table>
| MP 2 MP 7 | **6.EE.1-1**  
- Tasks involve expressing $b$-fold products $a \cdot a \cdot \ldots \cdot a$ in the form $ab$, where $a$ and $b$ are non-zero whole numbers  
- Tasks do not require use of the laws of exponents.  
**6.EE.1-2**  
- Tasks may involve simple fractions raised to | Students write numerical expressions (involving whole number exponents) from verbal descriptions.  
They also evaluate numerical expressions involving whole number exponents.  
Students demonstrate the meaning of exponents to write and evaluate numerical expressions with whole number exponents.  
The base can be a whole number, positive decimal or a positive fraction (i.e. $\left(\frac{1}{2}\right)^5$ can be | How are “standard form” and “exponential form” related?  
What is the purpose of an exponent?  
How are exponents used when evaluating expressions?  
How is the order of operations used to evaluate expressions? | Rules for Exponents  
Sierpinski’s Carpet  
The Djinni’s Offer  
Comparing Pencils  
I’ll Race You  
How Many Sections? |
- Small whole-number powers, e.g. $\left(\frac{1}{2}\right)^3$, $\left(\frac{2}{3}\right)^2$.
- Tasks may involve nonnegative decimals raised to whole-number powers.
- Tasks do not have a context

- Written $\frac{1 \ 1 \ 1 \ 1}{2 \ 2 \ 2 \ 2}$ which has the same value as $\frac{1}{32}$.

Students recognize that an expression with a variable represents the same mathematics (i.e. $x^5$ can be written as $x \cdot x \cdot x \cdot x \cdot x$) and write algebraic expressions from verbal expressions.

Order of operations is introduced throughout elementary grades, including the use of grouping symbols, ( ), { }, and [ ] in 5th grade. Order of operations with exponents is the focus in 6th grade.

**SPED Strategies:**
Create an anchor chart and graphic organizer illustrating what exponential form is, when it is used and how to evaluate an exponential expression.

Practice writing numerical and algebraic expressions that include whole number exponents for real world situations.

Review writing and evaluating numerical expressions containing whole-number exponents.

Create a graphic organizer and/or an anchor chart for order of operations.

How are exponents useful in solving mathematical and real world problems?

<table>
<thead>
<tr>
<th>Managing My Savings</th>
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<tr>
<td>Mrs. Alexander’s Offer</td>
</tr>
</tbody>
</table>
**ELL Strategies:**

Use an adapted text with a lower readability level, a teacher-modified text (with highlighted words, explanations, and context clues), or a simplified teacher-generated text illustrating properties of expressions and number exponents.

Word walls with translations side by side should be provided.

Utilize a KWL-chart graphic organizer, have the parts listed in both their L1 (students’ native language) and L2 (student’s target language) to clarify understanding.

Provide math word bank/translated/copied for students.

Math reference sheets should be provided.

Have students work in small groups, pairs or triads.
Provide vocabulary picture cards.

Create visual equivalent of terms and sample problems.

**Website:**

LearnZillion Lesson video (Spanish) for ‘Evaluate numerical expressions by using whole-number exponents’ [https://learnzillion.com/resources/53354](https://learnzillion.com/resources/53354)
New Jersey Student Learning Standard(s):
6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers.

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

Student Learning Objective 2: Use mathematical language to identify parts of an expression.

Modified Student Learning Objectives/Standards:
M.EE.6.EE.A.1–2: Identify equivalent number sentences.

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<tr>
<td>MP 2</td>
<td>6.EE.2b</td>
<td>Students should use the proper mathematical terms to identify the parts of an algebraic expression including term, factor, variables, coefficients, constants, and the names of operations (sum, difference, product, and quotient). Variables are letters that represent numbers. Evaluate algebraic expressions and formulas, including those involving exponents. There are various possibilities for the number they can represent. <strong>SPED Strategies:</strong> Create vocabulary picture cards.</td>
<td>What are the parts of the expression? How can you describe the expression? What do the values represent in the expression? What do the variables represent in the expression?</td>
<td>Student Task: Lesson 2 (covers both SLO 2 &amp; 5)</td>
</tr>
<tr>
<td>MP 7</td>
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</table>
Create mnemonic devices to assist students as they learn the new vocabulary of algebraic expressions and equations.

Create and review writing numerical expressions for real world situations.

Create graphic organizer and anchor chart for terms relating to numerical and algebraic expressions.

**ELL Strategies:**
Use an adapted text with a lower readability level, a teacher-modified text (with highlighted words, explanations, and context clues), or a simplified teacher-generated text illustrating properties of expressions and number exponents.

Word Walls with translations side by side should be provided.

Utilize a KWL-chart graphic organizer, have the parts listed in both their L1 (students’ native language) and L2 (students’ target language) to clarify understanding.

Provide math word bank/translated/copied for students.

Math reference sheets should be provided.

Have students work in small groups, pairs or triads.
Provide vocabulary picture cards. Create visual equivalent of terms and sample problems.

**Website:**
LearnZillion Lesson video (Spanish) 'Evaluate numerical expressions by using whole-number exponents'
https://learnzillion.com/resources/53354

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**New Jersey Student Learning Standard(s):**
6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers.

**6.EE.A.2a.** Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 - y.*

**6.EE.A.2c.** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas V = s³ and A = 6s² to find the volume and surface area of a cube with sides of length s = ½.*

**Student Learning Objective 3:** Write and evaluate algebraic expressions involving exponents (include evaluating formulas).

**Modified Student Learning Objectives/Standards:**
M.EE.6.EE.A.1–2: Identify equivalent number sentences.

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<td>MP 2 MP 7</td>
<td>6.EE.2a – Tasks do not have a context.</td>
<td>Students write expressions from verbal descriptions using letters and numbers,</td>
<td>How is the order of operations used to evaluate expressions?</td>
<td>Rectangle Perimeter Level C</td>
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<th>6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers.</th>
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**6.EE.A.2a.** Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 - y.*

**6.EE.A.2c.** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas V = s³ and A = 6s² to find the volume and surface area of a cube with sides of length s = ½.*

**Student Learning Objective 3:** Write and evaluate algebraic expressions involving exponents (include evaluating formulas).

**Modified Student Learning Objectives/Standards:**
M.EE.6.EE.A.1–2: Identify equivalent number sentences.

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**6.EE.A.2a.** Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 - y.*

**6.EE.A.2c.** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas V = s³ and A = 6s² to find the volume and surface area of a cube with sides of length s = ½.*

**Student Learning Objective 3:** Write and evaluate algebraic expressions involving exponents (include evaluating formulas).

**Modified Student Learning Objectives/Standards:**
M.EE.6.EE.A.1–2: Identify equivalent number sentences.

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<td>Students write expressions from verbal descriptions using letters and numbers,</td>
<td>How is the order of operations used to evaluate expressions?</td>
<td>Rectangle Perimeter Level C</td>
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</table>
• Numerical values in these expressions may include whole numbers, fractions, and decimals.

6.EE.2c-1
• Tasks do not have a context.
• Numerical values in these expressions may include whole numbers, fractions, and decimals.
• Task will not require operations on negative numbers.

6.EE.2c-2
• Tasks are simple applications of formulas that are provided in the prompt.
• Tasks do not require the student to manipulate the formula or isolate variables to solve an equation.
• Tasks have “thin context” or no context.
• Numerical values in these expressions may include whole numbers, fractions, and decimals.
• Task will not require operations on negative numbers.

Understanding order is important in writing subtraction and division problems.

Students understand that the expression “5 times any number, n” could be represented with 5n and that a number and letter written together means to multiply.

All rational numbers may be used in writing expressions when operations are not expected.

Students use appropriate mathematical language to write verbal expressions from algebraic expressions.

It is important for students to read algebraic expressions in a manner that reinforces that the variable represents a number.

Students are to evaluate algebraic expressions involving exponents (include evaluating formulas).

**SPED Strategies:**
Refer students to the anchor chart and graphic organizer illustrating what exponential form is, when it is used and how to evaluate an exponential expression that was created for SLO 1.

Support students as they practice writing numerical and algebraic expressions that include whole number exponents for real world situations.

How are properties of numbers helpful in evaluating expressions?

What strategies can I use to help me understand and represent real situations using algebraic expressions?

How are the properties (Identity, Associative and Commutative) used to evaluate, simplify and expand expressions?

How is the Distributive Property used to evaluate, simplify and expand expressions?

How can I tell if two expressions are equivalent?

**Substituting to Evaluate Addition and Subtraction Expressions**

**Writing and Evaluating Expressions – Multiplication and Division**

**Mailing Presents**

**The Oldest Pet**

**Children’s Ages**

**How Hot Is It?**

**Wrapping Presents**

**Distance to School**
Connect previously introduced concepts and vocabulary as needed to ensure that progress in writing and evaluating numerical expressions containing whole-number exponents is being made.

Refer to the graphic organizer and anchor chart for order of operations created for SLO 1.

**ELL Strategies:**
Use an adapted text with a lower readability level, a teacher-modified text (with highlighted words, explanations, and context clues), or a simplified teacher-generated text illustrating properties of expressions and number exponents.

Provide word walls with translations side by side.

Utilize a KWL-chart graphic organizer, have the parts listed in both their L1 (Students’ native language) and L2 (Students’ target language) to clarify understanding.

Provide math word bank/translated/copied for students.

Math reference sheets should be provided.

Have students work in small groups, pairs or triads.
Provide vocabulary picture cards.

Create visual equivalent of terms and sample problems.

**Website:**
LearnZillion Lesson video (Spanish) 'Evaluate numerical expressions by using whole-number exponents'
https://learnzillion.com/resources/53354

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**New Jersey Student Learning Standard(s):**

6.EE.A.3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*

6.EE.A.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

**Student Learning Objective 4:** Apply properties of operations (factor, distribute, and combine like terms) to generate equivalent expressions and to identify when two expressions are equivalent.

**Modified Student Learning Objectives/Standards:**

M.EE.6.EE.A.3: Apply the properties of addition to identify equivalent numerical expressions.

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</tr>
</thead>
<tbody>
<tr>
<td>MP 2</td>
<td>6.EE.4</td>
<td>Students combine like terms to generate an equivalent expression. Factoring needs to be utilized as a strategy to generate equivalent expressions.</td>
<td>How can I tell if a group of equations satisfies a property? (Commutative, Associative, Identity, Zero Property of)</td>
<td>IFL Task(s) – Set of Related Lessons named</td>
</tr>
<tr>
<td>MP 7</td>
<td>6.C.1.1</td>
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</tbody>
</table>
- Base explanations/reasoning on the properties of operations. Content Scope: Knowledge and skills articulated in 6.EE.3, 6.EE.4.

- Tasks should not require students to identify or name properties.

6.C.7

- Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 6.EE.4.

<table>
<thead>
<tr>
<th>Students use the distributive property to write equivalent expressions. Using their understanding of area models from elementary students illustrate the distributive property with variables. Properties are introduced throughout elementary grades (3.OA.5); however, there has not been an emphasis on recognizing and naming the property. In 6th grade students are able to use the properties and identify by name as used when justifying solution methods.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPED Strategies:</strong> Review properties of operations. Create flow chart/graphic organizer/anchor chart for the thought process involved in applying the properties of operations to generate equivalent expressions. Review and practice the Associative Properties of Addition and Multiplication. Refer to changing the placement of the grouping symbols without changing the value of the expression. Review and practice Commutative Properties of Addition and Multiplication. Refer to changing the order of the terms without changing the value of the expression.</td>
</tr>
<tr>
<td>Multiplication, and Distributive) How are properties of numbers helpful in computation? How can I tell if two expressions are equivalent? Like terms can be combined (added and subtracted) because they are the same unit. When you have a specific number of groups, you can decompose and partition the items in the group and thus make more groups that are smaller in size but the product will remain the same ((5 \times 3) + (5 \times 4) = 5(3 + 4) = 5 \times 7). Or, when you have a specific number of groups of items, you can decompose the groups of items and the product will remain the same. ((2 \times 7) + (3 \times 7) = (2 + 3)7 = 5 \times 7).</td>
</tr>
<tr>
<td>“Equivalent Expressions” PBA: Colin’s Coffee and Tea Task Rectangle Task Additional Task: Elk Street Pencil Collections Tissue Box Rectangular Perimeter 2 Equivalent Expressions Equivalent The Quilt of a Math Teacher Grocery Shopping</td>
</tr>
</tbody>
</table>
**Review and practice the Distributive Property** used to find the product of more complicated numbers [e.g. $7(36) = 7(30)+7(6)$].

Review and practice identifying the correct property when given an example.

Review and practice how equivalency can be determined between two expressions by using manipulatives and models ex. array model.

**ELL Strategies:**
Utilize body cues and hand gestures to assist with expression identification.

Create charts with mathematical concepts.

Pre-teach new vocabulary and meaning of symbols.

Provide translations of all content and general vocabulary words.

Create a chart of vocabulary with student friendly definitions.

Break down terms to familiar parts, suffixes or prefixes.

Provide flash cards (digital and tactile).

Embed visual, non-linguistic supports for vocabulary clarification.

Expressions are equivalent when they can be put in identical simplified form.
New Jersey Student Learning Standard(s):
6.EE.B.6: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Student Learning Objective 5: Use variables to represent numbers and write expressions when solving real-world or mathematical problems.

Modified Student Learning Objectives/Standards:
M.EE.6.EE.B.5–7: Match an equation to a real-world problem in which variables are used to represent numbers.

<table>
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<tr>
<td>MP 2</td>
<td>6.EE.6</td>
<td>A variable can represent an unknown number or any number in a set of numbers. Students write expressions to represent and solve various real-world situations. <strong>Examples:</strong> Maria has three more than twice as many crayons as Elizabeth. Write an algebraic expression to represent the number of crayons that Maria has. <strong>Solution:</strong> $2c + 3c$ represents the number of crayons that Elizabeth currently has.</td>
<td>Why do we use letters to represent numbers in mathematics? How can variables be used to describe patterns? How can algebraic expressions be used to model real-world situations?</td>
<td>Firefighter Allocation</td>
</tr>
<tr>
<td>MP 6</td>
<td></td>
<td></td>
<td></td>
<td>Student Task: Lesson 2 (covers both SLO 2 &amp; 5)</td>
</tr>
<tr>
<td>MP 7</td>
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<td>Elk Street Part 2</td>
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<td>The School Dance Pennies to Heaven</td>
</tr>
</tbody>
</table>
An amusement park charges $28 to enter and $0.35 per ticket. Write an algebraic expression to represent the total amount spent. **Solution:** $28 + 0.35t$ where $t$ represents the number of tickets purchased.

**SPED Strategies:**
- Review and practice how, when, and why variables are used to represent unknowns in real-world or mathematical situations.
- Review and practice variables that can be a letter or symbol representing an unknown number (e.g., the price of apples varies, so the cost of 4 apples can be represented as $4a$ where $a$ is the cost of an apple).
- Review and practice how algebraic expressions are used to solve real-world mathematical problems with a variable quantity.
- Practice writing and solving expressions that can be simplified when a value is assigned to the variable.
- Practice and review substituting and evaluating expressions with variables.

**Resources UDL - Visual and Auditory Learner(s):**
*How to Solve an Equation CCSS Math Content 6 EE B 6*
https://youtu.be/R13aHQr0r64
### Writing Expressions for Real World Problems

[https://youtu.be/SumTLQrCiBM](https://youtu.be/SumTLQrCiBM)

**ELL Strategies:**

- Develop graphic representations of math expressions and processes.
- Have students utilize white boards to represent their solutions for math expressions.
- Have students work in small groups, pairs/triads, to solve real-world mathematical problems.
- Provide ELL students with additional time and native language support during classroom activities.
- Provide students with graphic math organizers, which allow students to write and organize their thoughts.
- Peer Coaching: have ELL’s work with higher math proficient students for content support.
- Utilize technology to illustrate various mathematical problems with expressions.
New Jersey Student Learning Standard(s):  
6.G.A.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas \( V = l \times w \times h \) and \( V = B \times h \) to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

**Student Learning Objective 6:** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes and show that the volume is the same as it would be if found by multiplying the edge lengths; apply volume formulas to right rectangular prisms with fractional edge lengths.

**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 2 | **6.G.2-1**  
- Tasks do not have a context.  
- Tasks require focusing on the connection between packing the solid figure and computing the volume.  

**6.G.2-2**  
- Tasks focus on using the formulas in problem-solving contexts. | In 6th grade the unit cube will have fractional edge lengths (i.e. \( \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \)).  
Students find the volume of the right rectangular prism with these unit cubes.  
Students need multiple opportunities to measure volume by filling rectangular prisms with blocks and looking at the relationship between the total volume and the area of the base. Through these experiences, students derive the volume formula.  
In addition to filling boxes, students can draw diagrams to represent fractional side lengths, connecting with multiplication of fractions.  
Students are to pack a right rectangular prism with fractional edge lengths with unit fraction cubes. Show that the volume found by packing | How can I determine the appropriate units of measure that should be used when computing the volumes of a rectangular prism?  
How does the fractional edge length affect the volume of a prism?  
Why can different rectangular prisms have the same volume?  
How can I compare the volumes of two rectangular prisms?  
How can I estimate comparisons of volumes | Banana Bread  
Block Part-y  
Volume Lesson 11  
Volume Lesson 12  
Volume Lesson 13 |
is the same as would be found by multiplying the edge lengths of the prism. Application of the volume formulas, $V = l \times w \times h$ and $V = b \times h$, to right rectangular prisms with fractional edge lengths are to be understood.

This process is similar to composing and decomposing two-dimensional shapes.

**SPED Strategies:**
Provide key terms and strategies one would use to determine the volume of a right rectangular prism.

Review and practice measuring the number of units it takes to fill a right rectangular prism is one way to determine its volume.

Practice identifying fractional edge lengths of right rectangular prisms.

Review and practice selecting the appropriate fractional unit cube.

Extend practices by determining the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths.

Review vocabulary words and provide math pictures for association.

Provide 3-dimensional figures of rectangular prisms as a visual support.

| for prisms with fractional edge lengths? |  |  |
**ELL Strategies:**

Develop graphic organizers for students which show the formulas for volumes and rectangular prisms.

Small group/ triads: group highly proficient math students with low-level ELLs.

Create a large picture wall with different shapes, and formulas, with translated names of figures and properties.

Provide students with reference sheets with L1 (student’s native language) text materials.

Utilize white boards where students can draw mathematical representations of 3-dimensional figures and illustrate problem solving skills. Use of math journals for students to practice writing skills with math terminology.

Use of translation dictionary or software with the emphasis on surface area and relevant formulas.

**Website:**

*KHAN ACADEMY Geometry*

https://www.khanacademy.org/commoncore/grade-6-G
New Jersey Student Learning Standard(s):  
6.G.A.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Student Learning Objective 7: Represent three dimensional figures objects with nets made of rectangles and triangles, and use the nets to find the surface area of the figures in order to solve real world and mathematical problems.

Modified Student Learning Objectives/Standards: N/A

<table>
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<tr>
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</table>
| MP 1 | MP 4                                  | 6.G.4                         | A net is a two-dimensional representation of a three dimensional figure. Students represent three-dimensional figures whose nets are composed of rectangles and triangles. Students recognize that parallel lines on a net are congruent. Using the dimensions of the individual faces, students calculate the area of each rectangle and/or triangle and add these sums together to find the surface area of the figure. Students construct models and nets of three-dimensional figures, describing them by the number of edges, vertices, and faces. Solids include rectangular and triangular prisms. Students are expected to use the net to calculate the surface area. Students will represent three dimensional objects with nets made up of rectangles and triangles. | How do I use the nets of three dimensional figures to find surface area? How can I interpret and sketch views of rectangular and triangular prisms? How can you model finding surface area rectangular and triangular prisms? | Finding Surface Area  
Painting a Barn  
The File Cabinet  
Painting the Room  
Nets and Surface Area |
| MP 5 |                                       |                               | How can I determine the appropriate units of measure that should be |                             |                             |
triangles. They will find surface area of three-dimensional objects using nets and solve real world and mathematical problems involving surface area using nets.

**SPED Strategies:**
Illustrate the concept of a net by using concrete examples.

Practice using a three-dimensional figure to help find the surface area of a solid figure.

Demonstrate how the nets of 3 dimensional figures can facilitate the calculation of surface area.

Review surface area as the sum of the area of the faces of a polygon.

Review and practice how to find the area of compound figures.

Review vocabulary words and provide math pictures for association (i.e. face, net, plane figure, solid, surface area and three-dimensional).

**Resources UDL - Visual and Auditory Learner(s):**
*Learn how to compute the surface area of a triangular prism.*
**ELL Strategies:**
Develop graphic-organizers for students which show the formulas for volumes and rectangular prisms.

Small group/ triads: group highly proficient math students with low-level ELLs.

Create a large picture wall with different shapes, and formulas, with translated names of figures and properties.

Provide students with reference sheets with L1 (Student’s native language) text materials.

Utilize white boards where students can draw mathematical representations of 3-dimensional figures and illustrate problem solving skills.

Use of math journals for students to practice writing skills with math terminology.

Use of translation dictionary or software with the emphasis on surface area and relevant formulas.

**Website:**
*KHAN ACADEMY  Geometry*
https://www.khanacademy.org/commoncore/grade-6-G
Integrated Evidence Statements

6.C.9: 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 5.NBT, 5.MD.C.
   • Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to Grade 6.

6.D.1: Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 6, requiring application of knowledge and skills articulated in Type I, Sub-Claim A Evidence Statements.
   • Tasks may have scaffolding, if necessary, in order yield a degree of difficulty appropriate to Grade 6.

6.D.2: Solve multi-step contextual problems with degree of difficulty appropriate to Grade 6, requiring application of knowledge and skills articulated in 5.NBT.B, 5.NF, 5.MD, and 5.G.A.
   • Tasks may have scaffolding, if necessary, in order yield a degree of difficulty appropriate to Grade 6.

   • Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to Grade 6.
# Unit 2 Vocabulary

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<th>Expressions and Equations</th>
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<th>Geometry</th>
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<tbody>
<tr>
<td>- Algebraic expressions</td>
<td>- Order of Operations</td>
<td>- Area</td>
<td>- Squares</td>
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<tr>
<td>- Area models</td>
<td>- Product</td>
<td>- Base</td>
<td>- Surface area</td>
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<tr>
<td>- Associative Property of</td>
<td>- Quantity</td>
<td>- Composing</td>
<td>- Three-dimensional figure</td>
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<tr>
<td>Addition</td>
<td>- Quotient</td>
<td>- Cube</td>
<td>- Trapezoid</td>
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<tr>
<td>- Associative Property of</td>
<td>- Sum</td>
<td>- Cubic units</td>
<td>- Two-dimensional figure</td>
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<tr>
<td>Multiplication</td>
<td>- Term</td>
<td>- Decomposing</td>
<td>- Vertices</td>
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<tr>
<td>- Base</td>
<td>- Variables</td>
<td>- Dimensions</td>
<td>- Volume</td>
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<tr>
<td>- Base of an exponent</td>
<td>- Product</td>
<td>- Edges</td>
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<tr>
<td>- Coefficient</td>
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<td>- Equilateral triangle</td>
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<td>- Common factor</td>
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<td>- Face</td>
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<tr>
<td>- Commutative Property of</td>
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<td>- Fractional edge length</td>
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<tr>
<td>Addition</td>
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<td>- Height</td>
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<tr>
<td>- Commutative Property of</td>
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<td>- Isosceles</td>
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<tr>
<td>Multiplication</td>
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<td>- Kite</td>
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<tr>
<td>- Composite numbers</td>
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<td>- Lateral faces</td>
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<td>- Constant</td>
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<td>- Length</td>
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<tr>
<td>- Dependent variable</td>
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<td>- Net</td>
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<td>- Difference</td>
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<td>- Obtuse triangle</td>
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<tr>
<td>- Distributive property</td>
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<td>- Parallelogram</td>
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<tr>
<td>- Equivalent expressions</td>
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<td>- Polygon</td>
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<td>- Evaluate</td>
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<td>- Polyhedron</td>
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<td>- Exponent</td>
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<td>- Prism</td>
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<td>- Expression</td>
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<td>- Quadrilateral</td>
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<td>- Factor</td>
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<td>- Rectangles</td>
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<td>- Independent variable</td>
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<td>- Rhombi</td>
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<tr>
<td>- Inverse operations</td>
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<td>- Right rectangular prism</td>
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<td>- Like terms</td>
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<tr>
<td>- Numerical expressions</td>
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<td>- Right triangle</td>
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<tr>
<td>- Order of Operations</td>
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**References & Suggested Instructional Websites**

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<tr>
<td>Georgia Department of Education – Various Common Core resources</td>
<td>Various Common Core resources</td>
<td><a href="https://www.georgiastandards.org/Common-Core/Pages/Math-6-8.aspx">https://www.georgiastandards.org/Common-Core/Pages/Math-6-8.aspx</a></td>
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<tr>
<td>Illustrative Mathematics – Common Core tasks</td>
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<td><a href="https://www.illustrativemathematics.org/">https://www.illustrativemathematics.org/</a></td>
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<td>Learnzillion – Common Core lessons and presentations</td>
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<td>EngageNY – Common Core lessons and resources</td>
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<tr>
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<tr>
<td>Teachertube.com</td>
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Field Trip Ideas

**THE BOUNCE FACTORY** (Warren, NJ) - STEM- Inspired FUN Field Trips 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. The 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** (Jersey City, NJ) - 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/

**NATIONAL MUSEUM OF MATHEMATICS** (New York, NY) - 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. **Requires approval from Unit Superintendent** http://momath.org/

**MUSEUM OF AMERICAN FINANCE** (New York, NY) – For more than 20 years, educators from around the country have been bringing students to the Museum to help them understand how finance impacts their daily lives. The Museum offers discounted admission for pre-booked groups of eight or more, as well as a variety of classes for students in middle school through college. http://www.moaf.org/index

**LEGOLAND DISCOVERY CENTER** (Yonkers, NY) – Merry-Go-Round Workshop (Engineering Design, Mathematics, Listening and Speaking) This workshop provides a fun, hand-on way to get students excited about engineering, design, and mathematics. Students build a LEGO merry-go-round to explore gear ratios then experiment with gear trains to see which combination enables their ride to spin the fastest. **Requires approval from Unit Superintendent** https://www.legolanddiscoverycenter.com/westchester/education/elementary-school.aspx

**BUEHLER’S CHALLENGER & SCIENCE CENTER** (Paramus, NJ) - Fly a space mission beyond your wildest dreams in the challenger simulator! Students will work on teams to complete their mission, while conducting experiments, monitoring life support, and implementing navigation orders. In this dynamic environment, students use principles of science, mathematics, and technology to complete their tasks. There are 3 missions to choose from: “Rendezvous with Comet Halley”, “Return to the Moon”, “Voyage to Mars”.
**Requires approval from Unit Superintendent**
http://www.bcsc.org/5-9th-grade/

**BRANCH BROOK PARK SKATING RINK (Newark, NJ)** - A unique educational experience that gets students excited about learning! Students will learn how the concepts of Science, Technology, Engineering and Math can be found in everyday experiences, even FUN experiences like roller skating! Our professional STEM Educators teach visiting students about how STEM principles exist in just about every part of life. The lessons focus on hands on activities that are both educational and fun! Lessons are customized based on teachers needs to directly relate back to classroom learning making this program completely unique! Following the completion of the 1hour STEM Lesson, the students roller skate for physical fitness. While Roller Skating the concepts students learned are continually reinforced. Our lessons are designed not only to help students overcome their fear of learning STEM concepts but to show how STEM is both FUN & EXCITING!