

## Core Content

**Cluster Title: Apply and extend previous understandings of arithmetic to algebraic expressions.**

**Standard 2:** Write, read, and evaluate expressions in which letters stand for numbers.

c. 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  $s = 1/2$ .*

### **MASTERY Patterns of Reasoning**

#### **Conceptual:**

- Know that when using an expression to solve a problem, numbers replace variables in the expression and answers will vary depending on which numbers are substituted for variables.
- Extend understanding that we use standard formulas because of their potential to efficiently express relationships to include fractional units
- Extend understanding of standard formulas through composition or decomposition to include fractional units.

#### **Procedural:**

Find and use correct units of measure in solutions to real world problems.

Substitute values for variables in expressions (e.g., If I buy 2 bags of lemon drops, the expression can be written  $2x$ . If the cost of the bag is \$1.59 I can substitute that value in for  $x$ . If the next week the price changes to \$1.69 I can still use the same expression, assigning the new value to the variable).

Use order of operations including, exponents.

#### **Representational:**

Represent expressions, including standard formulas, with manipulatives, drawings, and diagrams.

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<p><b>Conceptual:</b>                      Recognize that variables represent unknown quantities.                      Standards: 6.ee.2a and 6.ee.2b</p> <ul style="list-style-type: none"> <li>• Understand that we use standard formulas because of their potential to efficiently express relationships with whole numbers.</li> <li>• Make sense of standard formulas through composition or decomposition using whole numbers.</li> </ul> <p><b>Procedural:</b>                      Use order of operations.</p> <p><b>Representational:</b>                      Create and use area models.                      Represent volume graphically and with manipulatives.</p>	
<b>Academic Vocabulary and Notation</b>	
<p>^, expression, equations, formula, order of operations, superscripted numbers, variable</p>	
<b>Instructional Strategies Used</b>	<b>Resources Used</b>
<ol style="list-style-type: none"> <li>1. Write an expression such as <math>x + 6</math> on the board. Leave space between the symbols and numbers. Give each student an index card with a different number from 0 – 20. Have a volunteer use his or her card to cover the <math>x</math>. Have another volunteer give the value for <math>x</math> and evaluate the expression. Summarize by saying, for example, When <math>x = 4</math>, then <math>x + 6 = 10</math>. Repeat with other students' cards and different expressions involving any of the four operations. Vary the degree of difficulty.</li> <li>2. In small groups, give students the expression <math>3 + 4 \times 5</math>. This represents the number of people coming to a party. There are three individuals and four families each with five members. List the steps you would use to solve this problem and justify each step. Next, have students write this expression for a variable number of</li> </ol>	<p><a href="http://www.cimt.plymouth.ac.uk/projects/mepres/book7/y7s22act.pdf">http://www.cimt.plymouth.ac.uk/projects/mepres/book7/y7s22act.pdf</a></p> <p><a href="http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/">http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/</a></p> <p><a href="http://www.math.niu.edu/~rusin/uses-math/games/krypto/">http://www.math.niu.edu/~rusin/uses-math/games/krypto/</a></p>

families. Allow students to reason which number becomes the variable.				
<b>Assessment Tasks Used</b>				
<b>Skill-based Task:</b> Complete the table by evaluating the algebraic expression.			<b>Problem Task:</b> You know that you can find the area of a triangle using the formula $A = \frac{1}{2}bh$ . If a triangle has an area of $48 \text{ cm}^2$ , what can its base and height be? Draw diagrams to justify your thinking.	
$x$	0	3	7	12
$5x + 8$				

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