Unit 6: Expressions and Equations

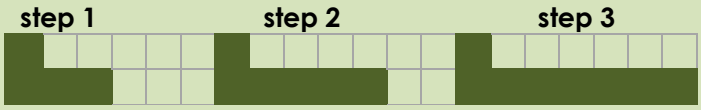
Dear Parents/Guardians,

In Unit 6, students investigate important algebraic ideas involving variables, expressions, and equations in non-traditional ways. In Lesson 1, students generate numerical and variable expressions to represent geometric patterns. In Lesson 2, students describe patterns with words, tables, graphs and equations. In Lesson 3, students revisit the counters model and extend this understanding to build variable expressions involving signed values. In Lesson 4, students use the distributive property to simplify expressions involving rational numbers and solve problems.

Visual Patterns

Students build and draw "growing" square tile patterns, keep track of data in tables, and display the information with graphs and equations.

Example:



Rate of Change

For every increase of x by 1, y increases by 3.

Input-Output Rule (in words)

Multiply the x-value by 3, then add 1 for the corresponding y-value.

Input-Output Rule (as an equation)

$3x+1=y$

Table

step # (x-values)	number of tiles (y-values)
1	4
2	7
3	10
4	13
5	16
x	3x+1

Expressions with Cups and Counters

Students extend the counter model with integers to include a "cup," drawn as a V, as in the word "variable;" and an "upside-down cup," drawn as a Λ. A cup represents a value, like x, whereas the upside-down cup represents its opposite, or -x. They manipulate expressions using this model to help with the transition to representing them symbolically.

Symbolic Notation	Visual Representation	
$3x-5+2x+2$	Λ Λ Λ − − − − − V V + +	Combine like terms.
$3x+2x-5+2$	V V V V V − − − − − + +	Remove zero pairs.
$5x-3$	V V V V V − − −	
$-3x-5+2x+2$	Λ Λ Λ − − − − − V V + +	Combine like terms.
$-3x+2x-5+2$	Λ Λ Λ V V − − − − − + +	Remove zero pairs.
$-x-3$	Λ − − −	

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Math Links GRADE 7

By the end of the unit, your student should know…

- How to write a numerical expression to represent a geometric pattern [Lessons 6.1, 6.2]
- How to generalize a geometric pattern with an algebraic rule [Lessons 6.1, 6.2]
- How to describe patterns with words, tables, graphs, and equations [Lesson 6.2]
- How to use a model to represent variable expressions [Lesson 6.3]
- How to manipulate variable expressions using symbolic notation [Lesson 6.4]

Additional Resources

- For definitions and additional notes please refer to Student Resources at the end of this unit