6th Grade – Unit 5
Using Expressions

In this unit, students extend their arithmetic work to include using letters to represent numbers. Students explore letters as representations of numbers and see that arithmetic is carried out exactly as it is with numbers. Students explore operations in terms of verbal expressions and determine that arithmetic properties hold true with expressions because nothing has changed and the arithmetic is the same.

Key Words

umerical Expression – numbers, mbols, and operators (such as + x) grouped together to show the lue of something.

gebraic Expression – an pression that includes at least e variable.

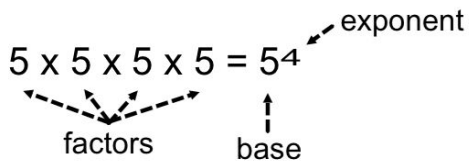
uivalent Expressions – two pressions are *equivalent* if both aluate to the same number for ery substitution of numbers into the letters in both expressions.

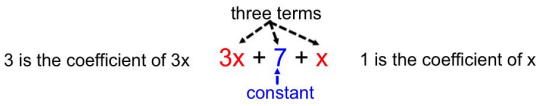
riable – a symbol use to present an unknown value. It is ually a letter like x or y.

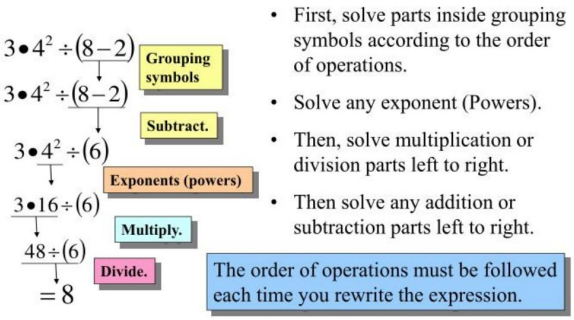
aluate – to calculate of the value

ponent Notation – A product of e factors can be written in ponential form using an exponent d a base. The **base** is the number ed as a factor. The **exponent** tells w many times a base is used as a ctor.

efficient – the factor that ltiplies the variable.







How can I help at home?

- ★ Ask your child what they learned in school and ask them to show you an example.
- ★ Ask your child to explain t difference between numeric expressions and algebraic expressions.
- ★ Discuss with your child wh the Order of Operations is so important.
- ★ Ask your child to explain why 6x + 10, 2(3x + 5), and 2x + 4 + 4x + 6 are equivalent expressions.
- ★ Ask your child to evaluate $3x^2 + 5x + 10$ for x = 6 and = 2.
- ★ Discuss situations that could be represented using algebraic expressions. For example, when at the stor if a box of pasta costs $5.45 ask your child to write an expression for an unknown number of boxes (5.45x) and evaluate it for given number of boxes.

Common Core Standards

★ Apply and extend previous understandings of arithmetic to algebraic expressions.
- Write and evaluate numerical expressions involving whole-number exponents.
- Write, read, and evaluate expressions in which letters stand for numbers.
- Apply the properties of operations to generate equivalent expressions.
- Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

Sample Problems

Writing Expressions in Which Letters Stand for Numbers

1. ***b* decreased by *c* squared.**

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   $b - c^2$

2. **24 divided by the product of 2 and *a*.**

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   $\frac{24}{2a}$

Example and Solution:

What is the difference between $3g$ and g^3?

$3g$ means $g + g + g$ and g^3 means $g \times g \times g$

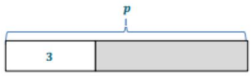
Problem and Solution:

Write an expression to show the sum of w and 4 and draw a model.

Solution: w + 4 or 4 + w

Students understand that these two expressions are equivalent.

Write an expression to show the difference of p and 3.



Answer: p – 3

Could we also say 3 – p?

Answer: No, if we started with 3 and took p away, the models would not match. For instance if the value of p is 10 then 10 minus 3 is not the same as 3 minus 10.

Students recognize that these two expressions are not the same because the commutative property does not apply to subtraction.

Problem to Try at Home

Noah and Carter are collecting box tops for their school. They each bring in 1 box top per day starting on the first day of school. However, Carter had a head start because his aunt sent him 15 box tops before school began. Noah's grandma saved 10 box tops, and Noah added those on his first day.

a. Fill in the missing values that indicate the total number of box tops each boy brought to school.

School Day	Number of Box Tops Noah Has	Number of Box Tops Carter Has
1	11	16
2		
3		
4		
5		

b. If we let *D* be the number of days since the new school year began, on day *D* of school, how many box tops will Noah have brought to school?

c. On day *D* of school, how many box tops will Carter have brought to school?

d. On day 10 of school, how many box tops will Noah have brought to school?

e. On day 10 of school, how many box tops will Carter have brought to school?

Solution:

a.

School Day	Number of Box Tops Noah Has	Number of Box Tops Carter Has
1	11	16
2	12	17
3	13	18
4	14	19
5	15	20

b: $D + 10$ box tops

c: $D + 15$ box tops

d: 20 box tops

e: 25 box tops

Coming Up Next...

Students will extend their knowledge of algebraic expressions to explore equations and inequalities. They will use their knowledge of evaluating expressions to determine solutions to equations and inequalities as well as learn new strategies to determine these solutions.