Eureka Math™ Tips for Parents

Grade 6
Module 4

Key Words

Simple Expression
A *simple expression* is a number, a letter which represents a number, a product whose factors are either numbers or letters involving whole number exponents, or sums and/or differences of such products. Each product in a simple expression is called a *term*, and the evaluation of the numbers in the product is called the *coefficient of the term*.

Linear Expression
A *linear expression* is a product of two simple expressions where only one of the simple expressions has letters and only one letter in each term of that expression or sums and/or differences of such products.

Equivalent Expressions
Two simple expressions are *equivalent* if both evaluate to the same number for every substitution of numbers into all the letters in both expressions.

Equation
An *equation* is a statement of equality between two expressions.

Truth Values of a Number Sentence
A number sentence is said to be *true* if both numerical expressions are equivalent; it is said to be *false* otherwise. *True* and *false* are called *truth values*.

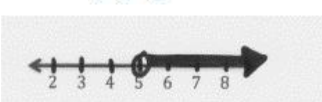
Exponential Notation for Whole Number Exponents
Let m be a non-zero whole number. For any number a, we define a to be the product of m factors of a, i.e., $a^m = a \cdot a \cdot a \cdot a \ldots \cdot a$ (multiplied together m times). The number a is called the *base*, and m is called the *exponent*, or *power* of a.

How can you help at home?

- ✓ Ask your child what they learned in school today and ask them to show you an example.
- ✓ Using the following set of numbers, ask your child to determine the number(s) that make the inequality true.
  $\{0,1,5,8,11,17\}$
  5 h > 40
  (Solution: h can be 11 *or* 17*)*
- ✓ Ask your child to explain the difference between a straight angle and a reflex angle.
  (Solution: A straight angle has a measurement of exactly 180° while a reflex angle has a measurement between 180° and 360°.)

Tarek has more than $5.

$t > 5$



Expressions and Equations

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. Students determine that letters are used to represent specific but unknown numbers and are used to make statements or identities that are true for all numbers or a range of numbers.

What Came Before this Module:

Students extended the number line (both horizontally and vertically) to include the opposites of whole numbers and to serve as a model to relate integers and other rational numbers. Students also saw how the number line model is extended to two-dimensions, used the coordinate plane to model, and solved real-world problems involving rational numbers.

What Comes After this Module:

Students will utilize their previous experiences in shape composition and decomposition in order to understand and develop formulas for area, volume, and surface area.

Key Common Core Standards:

Apply and extend previous understandings of arithmetic to algebraic expressions.

- Write and evaluate numeric 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).

Reason about and solve one-variable equations and inequalities.

- Understand solving an equation or inequality as a process of answering a question; which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- 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.
- Solve real-world and mathematical problems by writing and solving equations in the form $x+p=q$ and $px=q$ for cases in which p, q and x are all nonnegative rational numbers.
- Write an inequality of the form $x>c$ or $x<c$ to represent a constraint or condition in a real-world mathematical problem. Recognize that inequalities of the form $x>c$ or $x<c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Represent and analyze quantitative relationships between dependent and independent variables.

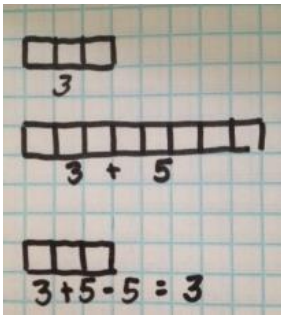
- Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Using Tape Diagrams to Show the Relationship Between Addition and Subtraction

Draw a tape diagram to represent the following number sentence.

$$3 + 5 - 5 = 3$$

Solution:



Explanation:

← Start with three tiles (3).

← Add five more (+5).

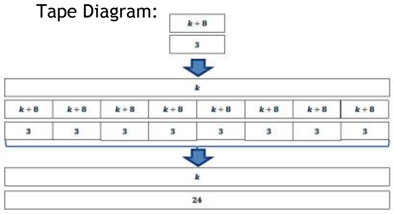
← Take away five tiles (-5). You are left with three tiles (=3).

Here is another example.

Equation:

$$\frac{k}{8} = 3$$

Tape Diagram:



Algebraically:

$\frac{k}{8} = 3$

$\frac{k}{8} \cdot 8 = 3 \cdot 8$

$k = 24$

Check: $\frac{24}{8} = 3$; $3 = 3$. *This number sentence is true, so* 24 *is the correct solution.*

Writing Expressions in Which Letters Stand for Numbers

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

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

$b - c^2$

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

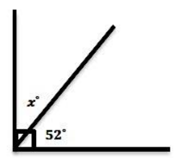
24 divided by the product of 2 and ***a*****.**

$\frac{24}{2a}$

Writing and Solving Equations

Write and solve an equation for each problem.

Solve for x.



Solution:

$x° + 52° = 90°$

$x° + 52° - 52° = 90° - 52°$

$x° = 38°$

Substituting to Evaluate Addition and Subtraction Expressions

In the example below, students develop expressions involving addition and subtraction from real-world problems. They also evaluate these expressions for given values.

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