

Algebra Basics

Algebra is the study of the unknown. Fans of mystery and investigations will love algebra. This field of study is famous because it is where letters are used in equations. These letters are called **variables**. People who are strong algebraic thinkers can save themselves a lot of time planning things as an adult!

Vocabulary	
Variable	A letter, shape, or symbol used to represent an unknown number.
Equation	A mathematical statement that shows two expressions as being equal. Must have an equal sign. =
Expression	A way to represent a number, usually with a mathematical operation. + - x ÷ NO equal sign
Inverse Operation	Using the opposite operation to solve or check an equation.
Fact Family	A trio of numbers that are related to each other within an inverse operation. EX. 2, 3, 6 OR 2, 3, 5

Variables

Some variables can be easily figured out.	Others are much more difficult to deduce.
$3 + a = 7$ $a =$ $s \times 4 = 0$ $s =$ $9 - p = 2$ $p =$ $5 \div g = 1$ $g =$	$123 + f = 200$ $f =$ $9 \times d = 108$ $d =$ $q - 431 = 272$ $q =$ $y \div 7 = 9$ $y =$

How do we find the difficult variables?

Let's solve this multiplication equation.

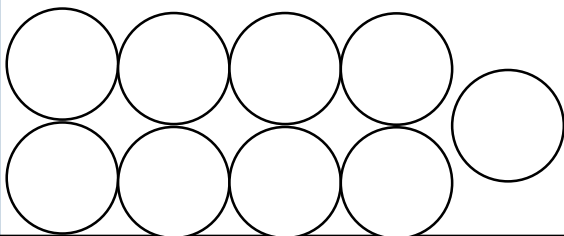
$$9 \times d = 108 \qquad d =$$

What do we know?

How many groups? How many total x's?

What are we missing?

How many in each group?



Let's solve this division equation.

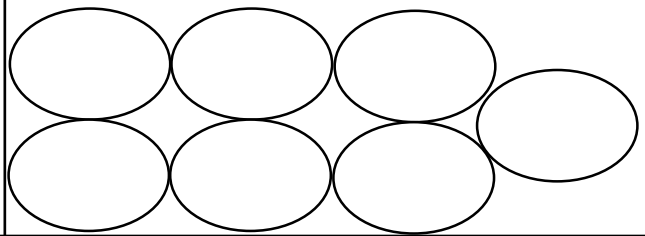
$$y \div 7 = 9 \qquad y =$$

What do we know?

How many groups? How many x's in each group?

What are we missing?

How many x's were shared?



Inverse Operations

We have learned that **multiplication** and **division** are **inverse operations**, which means they can be used to solve each other. Does the same work for **addition** and **subtraction**?

Let's solve this addition equation.

$$123 + f = 200 \quad f =$$

What do we know?

What did we start with? What is the total?

What are we missing?

What are we adding?



Let's solve this subtraction equation.

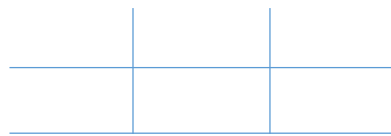
$$q - 431 = 272 \quad q =$$

What do we know?

How much did we remove? How much was left?

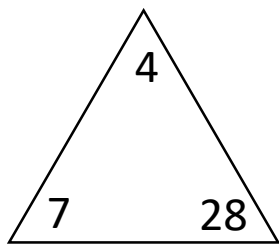
What are we missing?

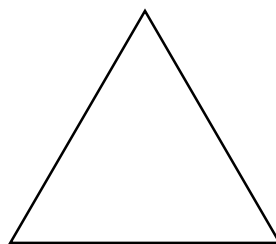
What did we start with?



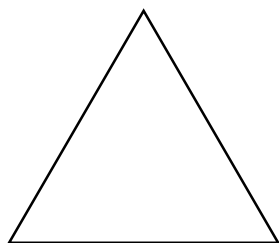
Does the same work for **addition** and **subtraction**?

Fact Families





$$20 - 8 = 12$$



$$4 \times w = 20$$

