

**Algebra I**  
**Lesson 2.2: Solving Equations by Multiplying or Dividing**  
**Mrs. Snow, Instructor**

Last lesson we learned how to solve an equation by adding or subtracting. Similarly we can use multiplication and division to solve equations when there is a **coefficient** (number), associated with the variable.

To solve an equation for a variable, you need to peel off all the number that is, get rid of stuff that is being added/subtracted in the equation, then get rid of any coefficients that are attached to the variable.

**RULE:** The equation must be kept in balance. WHAT YOU DO TO THE LEFT YOU MUST DO TO THE RIGHT



Inverse Operations, a.k.a. opposites	
Operation	Inverse (opposite)
Multiplication $\times$	Division $\div$
Division $\div$	Multiplication $\times$

A good practice to start getting into now is using *and* understanding the relationship between a number and it's reciprocal. **Definition:** the reciprocal of  $a$  is  $\frac{1}{a}$ ; the product of a number and it's reciprocal is **1**.

**Example:** ID the reciprocals:  $5$ : reciprocal =  $\frac{1}{5}$        $-7$ : reciprocal =       $\frac{2}{3}$ : reciprocal =

**Solve the equations by using multiplication:**

$\frac{r}{6} = 8$ $(6)\frac{r}{6} = 8(6)$ $r = 48$	1. Multiply each side by the reciprocal	$\frac{x}{4} = 5$	$-6 = \frac{y}{9}$	$-8 = -\frac{t}{8}$	$\frac{x}{5} = \frac{3}{25}$	$\frac{1}{3} = \frac{g}{7}$
--	---	-------------------	--------------------	---------------------	------------------------------	-----------------------------

When instructed to solve an equation by division, remember we can also use the reciprocal to perform the same task. How? See how reciprocal multiplication yields the same answer as dividing.

*The reciprocal process is an important skill necessary for success in Algebra II.*

$5y = 25$ $(\frac{1}{5})5y = 25(\frac{1}{5})$ $y = 5$	1. What is the reciprocal of 5? 2. Multiply each side by the reciprocal	$5y = 25$ $\frac{5y}{5} = \frac{25}{5}$ $y = 5$	1. Divide each side by 5 2. Simplify
<i>While dividing is all well and good, you can solve for your variable using the reciprocal just as easily AND you will be better prepared for higher level math classes!!</i>			

<b>Solve each equation by using reciprocal multiplication:</b> $7x = 56$ $(\frac{1}{7})7x = 56(\frac{1}{7})$ $x = \frac{56}{7}$ $x = 8$	1. What is the coefficient of x? 2. What is its reciprocal? 3. Multiply both sides by the reciprocal of 7. 4. reduce the fraction into simplest form	$13 = -2w$	$16 = 4c$	$15k = 75$
---	---	------------	-----------	------------

Try these problems that have fractions for coefficients:

$\frac{5}{9}v = 35$	$-\frac{1}{4} = \frac{1}{5}b$	$\frac{4j}{6} = \frac{2}{3}$
---------------------	-------------------------------	------------------------------

$\frac{1}{6}w = 102$	$0.5y = -10$ (hint: convert to a fraction)
----------------------	--

**Write and solve an equation for each situation:**

<p>The distance in miles from the airport that a plane should begin descending, divided by 3, is equal to the plane's height above the ground <i>in thousands of feet</i>. If a plane is 10,000 feet above the ground. When should the pilot begin his descent?</p>	<p>Some people say you can predict a child's adult height by taking the child's height at the second birthday and multiply it by two. If Jared is 37 inches tall on his second birthday, how tall should be as an adult?</p>
Simplify $\sqrt{121}$	$-\sqrt{16}$