Algebra I
Lesson2.3 Solving Multi-Step Equations
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What do we do when the equation is more complicated, that is just adding or multiplying will not give us an answer for our variable? Well, we need to remember that solving an equation is like solving a puzzle. Use our math operations until we get the variable by itself on one side of the equation.

Example: solve for x

$(3x)+ 5 = 23$

Before we set about to solve, we need to isolate the variable: Circle it. We need to get the variable by itself on one side of the equation.

$3x + 5 - 5 = 23 - 5$

1. How do we get rid of the "5" on the left side of the equation? *Inverse operation.* Remember to keep the equation in balance.

$3x = 18$

$\frac{1}{3}(3x) = \frac{1}{3}(18)$

$x = 6$

Have we solved for x? No. How do we get rid of the coefficient? *Reciprocal.*
2. Multiply each side by the reciprocal of 3.

Now we have solved for our variable!

Solve for the variable:

$12 = 4 + 2x$ $12 - 4 = 4 + 2x - 4$ $8 = 2x$ $\frac{1}{2}(8) = \frac{1}{2}(2x)$ $4 = x$	$-4 + 7x = 3$	$1.5 = 1.2y = 5.7$	$\frac{n}{7} + 2 = 2$
$\frac{q}{15} - \frac{1}{5} = \frac{3}{5}$ $\frac{q}{15} - \frac{1}{5} + \frac{1}{5} = \frac{3}{5} + \frac{1}{5}$ $\frac{q}{15} = \frac{4}{5}$ $(15)\frac{q}{15} = (15)\frac{4}{5}$ $q = (3)4$ $q = 12$	$\frac{2x}{5} - \frac{1}{2} = 5$	$\frac{3}{4}u + \frac{1}{2} = \frac{7}{8}$	$\frac{1}{5}n - \frac{1}{3} = \frac{8}{3}$

What if there are several terms with variables OR lots of numbers OR parentheses???

COMBINE LIKE TERMS   *USE THE DISTRIBUTIVE PROPERTY TO GET RID OF PARETHESES*

$6x + 3 - 8x = 13$
$6x - 8x + 3 = 13$ 1. Rearrange by grouping all of the $x's$ together, now combine.
$-2x + 3 = 13$
$-2x + 3 - 3 = 13 - 3$ 2. Use the inverse property of addition to isolate the x term
$-2x = 10$ *(subtract 3)*
$\left(-\frac{1}{2}\right)(-2x) = \left(-\frac{1}{2}\right)(10)$ 3. Use the reciprocal of the coefficient to solve for x. *CAUTION!!*
$x = -5$ *Don't forget the negative!*

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$9 = 6 - (x + 2)$ 1. Use distribution. *Remember this is like multiplying by* -1
$9 = 6 - x - 2$ 2. Combine like terms
$9 = 4 - x$
$9 - 4 = 4 - x - 4$ 3. Use the inverse property of addition to get the x by itself.
$5 = -x$
$(-1)5 = -x(-1)$ 4. What do we do to get rid of the negative??? *Multiply by* -1
$-5 = x$

YOU TRY:

$2a + 3 - 8a = 8$	$-2(3 - d) = 4$	$4(x - 2) + 2x = 40$
Alex joined an internet music club. A membership costs $19.95. The membership allows Alex to buy CD's for $3.95 each. If Alex's bill is $63.40, how many CD"s did he buy?	The sum of the measures of two angles is 180°. One angle measures *3a* and the other angle measures *2a-25*. Find *a*. Then find the measurement of each angle.	Sara and Laura are best friends. Sara is the oldest. The sum of their ages is 57. Find Sara and Laura's ages.