PRINCIPLES - LESSON 3C
EQUATIONS WITH VARIABLE ON BOTH SIDES

How do we solve this equation?

$2x + 7 = x - 3$

ex1) $2x + 7 = x - 3$

$-x \quad -x$

$x + 7 = -3$

$-7 \quad -7$

$x = -10$

OR

ex2) $2x + 7 = x - 3$

$-2x \quad -2x$

$7 = -1x - 3$

$+3 \qquad +3$

$\frac{10}{-1} = \frac{-1x}{-1}$

$-10 = x$ OR $x = -10$

We have to get the variable to one side of the equation only.

FIVE SIMPLE STEPS TO SOLVING EQUATIONS

STEPS TO SOLVING EQUATIONS

1. Get rid of grouping symbols. (usually by distributing)
2. Combine like terms on left side. Then, combine like terms on right side.
3. Get the variable to one side of the equation. (by adding or subtracting)
4. Undo addition/subtraction.
5. Undo multiplication/division.

IT IS ALWAYS A GOOD IDEA TO CHECK YOUR SOLUTION TO SEE THAT IT MAKES THE EQUATION TRUE.

An equation is a puzzle. Your job is to find out which number behaves in the way that the variable behaves in the equation.

SOLVING EQUATIONS WITH VARIABLE ON BOTH SIDES

Solve each equation.

ex3) $3x + 2 = -x - 2$

$+x \quad +x$

$4x + 2 = -2$

$-2 \quad -2$

$\frac{4x}{4} = \frac{-4}{4}$

$\boxed{x = -1}$

ex4) $-r = -4r + 2$

$+4r \quad +4r$

$\frac{3r}{3} = \frac{2}{3}$

$\boxed{r = \frac{2}{3}}$

There is no need to convert to a decimal.

SOLVING EQUATIONS WITH VARIABLE ON BOTH SIDES

Solve.

ex5) $-36 + 2n = -3n + 1n - 5n$

Combine like terms on each side whenever possible.

$-36 + 2n = -7n$

$-2n \quad -2n$

$\frac{-36}{-9} = \frac{-9n}{-9}$

$4 = n$ OR $\boxed{n = 4}$

SOLVING EQUATIONS WITH VARIABLE ON BOTH SIDES

Solve.

ex6] $2y + 3(y - 9) = -1(3y - 18) - y$

$2y + 3y - 27 = -3y + 18 - 1y$

$5y - 27 = -4y + 18$

$+4y \qquad +4y$

$9y - 27 = 18$

$+27 \quad +27$

$\frac{9y}{9} = \frac{45}{9}$

$\boxed{y = 5}$

SOLVING EQUATIONS WITH VARIABLE ON BOTH SIDES

Solve.

ex7) $-4(w-2)-8=5(2w+6)-2$

$-4w+8-8=10w+30-2$

cancel

$-4w=10w+28$

$-10w \quad -10w$

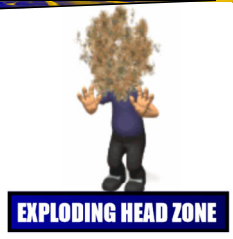
$\frac{-14w}{-14}=\frac{28}{-14}$

$w=-2$

SOLVING EQUATIONS WITH VARIABLE ON BOTH SIDES

Solve.

ex8) $-3[4m+2(m-4)]=-5[2(m+5)]$



$-3[4m+2m-8]=-5[2m+10]$

$-3[6m-8]=-5[2m+10]$

$-18m+24=-10m-50$

$+10m \qquad +10m$

$-8m+24=-50$

$-24 \qquad -24$

$\frac{-8m}{-8}=\frac{-74}{-8}$

$m=\frac{74}{8}$ always reduce! $\Longrightarrow$ $\boxed{m=\frac{37}{4}}$