Solving Systems Using Elimination

The Elimination Method

STEP 1 **Multiply** one or both of the equations by a constant to obtain coefficients that differ only in sign for one of the variables.

STEP 2 **Add** the revised equations from Step 1. Combining like terms will eliminate one of the variables. Solve for the remaining variable.

STEP 3 **Substitute** the value obtained in Step 2 into either of the original equations and solve for the other variable.

*create "opposites" on one of the variables

Example 1:

Solve this system using the elimination method:

$4x - 2y = -14$
$-4x + 12y = -16$

$10y = -30$
$y = -3$

$4x - 2(-3) = -14$
$4x + 6 = -14$
$4x = -20$
$x = -5$

$(-5, -3)$

Key Point: Try to "make opposites" on one of the variables.

Example 2:

$4x - 4y = 16$ → $4x - 4y = 16$
M(2) $-2x - y = 7$ → $-4x - 2y = 14$

$-6y = 30$
$y = -5$

$-2x - (-5) = 7$
$-2x + 5 = 7$
$-2x = 2$
$x = -1$

$(-1, -5)$

Example 3:

$7x + 2y = 46$ → $7x + 2y = 46$
M(-1) $3x + 2y = -2$ → $-3x - 2y = 2$

$4x = 48$
$x = 12$

Now find y...

Example 4:

M(2) $7x + 2y = 11$ → $14x + 4y = 22$
M(7) $-2x + 3y = 29$ → $-14x + 21y = 203$

$25y = 225$
$y = 9$

Now find x...

Remember: If the variables "disappear" ...

False statement (like $0 = 5$) then there is no solution because the lines are parallel.

True statement (like $0 = 0$) then there are infinitely many solutions because the lines are identical.