

7.1 – SOLVING SYSTEMS OF EQUATIONS BY GRAPHING:

Solving two or more linear equations at the same time is a system of linear equations. A solution is any ordered pair that makes each equation work when you substitute it in for x and y .

Graphing – Find the point of intersection for the 2 lines. This is a solution.

of solutions:

Lines that are parallel never intersect. Therefore, there is no solution

If the equations are the same line then there are an infinite # of solution since every point for one equation works for the other.

There is only one solution if the two lines intersect at one point. Most systems of equations will have one solution.

Example: Is $(-1,5)$ a solution for $y = 2x + 7$ and $y = x + 6$?

Plug in $-1, 5$ into both equations: $5 = 2(-1) + 7$ and $5 = -1 + 6$ It works! The solution must work for both equations.

7.2 – SOLVING SYSTEMS OF EQUATIONS BY SUBSTITUTION:

A) Both equations are in slope-intercept form ($y = y$):

Example: $y = 4x - 8$ and $y = 2x + 10$ so substitute for $y = y$:

$$4x - 8 = 2x + 10 \quad \text{Solve with algebra and } x = 9$$

Check by substituting 9 for x into both equations. They both equal 28 . The solution (point of intersection is $(9, 28)$)

B) One equation is slope-intercept and the other is standard form:

Example:

$$3y + 2x = 4 \quad \text{and} \quad y = 6x - 7$$

$y = 6x - 7$ **Substitute $6x - 7$ for y in the other equation:**

$3(6x - 7) + 2x = 4$ **Solve using the distributive property and algebra**

$$x = 1.25$$

Check it. Substitute 1.25 for x in each equation. $y = 0.5$ in each equation.

The solution (point of intersection) is the ordered pair (1.25, 0.5)

7.3 – SOLVING SYSTEMS OF EQUATIONS BY ELIMINATION:

Both equations are in standard form. You adjust each equation as needed to eliminate one of the variables. You decide which variable is easier to eliminate. You will add the 2 equations once you have set it up

Don't do anything:

$$4x + 6y = 8$$

$2x - 6y = 4$ The y's will cancel if you add.

Don't change anything.

$$6x = 12$$

$x = 2$ **Substitute 2 in for x and find y. $y = 0$. The solution is (2,0).**

Adjust 1 Equation:

$$4x + 4y = 6$$

$2x + 5y = 12$ **Adjust the bottom equation so it is $-4x$. Multiply ALL OF IT by -2 .**

$$4x + 4y = 6$$

$-2(2x + 5y = 12)$ **It becomes:**

$$4x + 4y = 6$$

$-4x - 10y = -24$ **Now add each column**

$$-6y = -18$$

$y = 3$ **YOU SOLVED FOR y** so substitute 3 in for y and find x . $x = -1.5$. The solution is $(-1.5, 3)$.

$(-1.5, 3)$ must work for both equations. It does.

Adjust Both Equations:

$$2x + 2y = 6$$

$3x + 5y = 12$ Choose which variable you want to eliminate. I will get rid of x .

$3(2x + 2y = 6)$ Multiply ALL OF the TOP equation by 3 and

$-2(3x + 5y = 12)$ ALL OF the BOTTOM equation by -2

$$6x + 6y = 18$$

$-6x - 10y = -24$ Now add each column

$$-4y = -6$$

$y = 1.5$ **YOU SOLVED FOR y** so substitute 1.5 in for y and find x . $x = 1.5$. The solution is $(1.5, 1.5)$.

(1.5, 1.5) must work for both equations. It does.
