|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Systems of Equations** | Systems of Equations refers to two or more equations that share the same variables. The solution to a system is the value of each variable that makes BOTH equations true. There can be **one solution, no solution, or infinite solutions**

|  |  |  |  |
| --- | --- | --- | --- |
| **Method** | **One Solution** | **No Solution** | **Infinite Solutions** |
| Graphing | ***Best to use when both equations are in slope intercept form:******y = mx+b***1.Put both equations in slope intercept form.2. Graph both equations3. The solution is the (x,y) of the point of intersection | **Solution is the point of intersection of the lines** | **Lines are parallel and do not intersect** | **Lines are identical and intersect at every point.***The equations represent the same line just written in different forms.*  |
| Substitution | ***Best to use when one equation has been solved for a variable***y = -x +12x+3y = 21.Choose one equation to solve for one variable. This will be equation 1.2.Subsitute the expression that equals y from equation 1 into equation 2.3.Solve for x in equation 24.Substitute value of x back into original equation to solve for y.  | **y = -x + 6****-3x + y =2****-3x + (-x+6) = 2****-3x-x+6 = 2****-4x + 6 = 2** **-6 -6****- 4x = - 4****- 4 - 4** **x = 1****y = - x + 6****y = -1+6****y = 5***Solution (1,5)* | **2y – x = 6****y =** $\frac{1}{2}$ **x – 2****2(**$\frac{1}{2}$ **x – 2) – x = 6****x – 4 – x = 6****- 4 = 6***Since this is not true, there is no solution* | **2x + 2y = 6****y = - x + 3****2x + 2(-x+3) = 6****2x – 2x+ 6 = 6****6 = 6***Since this is always true, there are infinite solutions* |
| Elimination | ***Best to use when both equations are in standard form and coefficients of variables are opposites or can be made opposites by multiplying.***1.Determine which variable to eliminate (look for variables with the same coefficient or multiply by a factor that creates variables with the same coefficient.2.Add or subtract the equations to eliminate one variable (add down) and solve.3.Substitute the found variable back into an original equation to solve for the other variable. | **x + y = 6****-3x + y = 2****-1 (x + y = 6)****- x –y = -6****-3x + y = 2****- 4x = - 4****- 4 - 4****x = 1****x + y = 6****1 + y = 6****-1 -1****y = 5***Solution (1,5)* | **2y – x = 6****y -** $\frac{1}{2}$ **x = -2****-2 (y -** $\frac{1}{2}$ **x = -2)****-2y + x = -2****2y – x = 6****0 = 4***Since this is never true, there is no solution* | **2x + 2y = 6****x + y = 3****-2(x + y = 3)****-2x – 2y = -6****2x + 2y = 6****0 = 0** *Since this is always true, there are infinite solutions* |

 |