

Solve Systems of Linear Equations

- Graphing the lines
- Substitution
- Elimination

* The solution to a system is where the lines intersect.

* No solution = parallel lines

* Infinitely many solutions = same line

GRAPHING

$$3x - 2y = -6$$

$$x + y = -2$$

* Rewrite as $y = mx + b$

$$\begin{array}{r} 3x - 2y = -6 \\ -3x \quad -3x \\ \hline \end{array}$$

$$\begin{array}{r} -2y = -3x - 6 \\ -2 \quad -2 \\ \hline \end{array}$$

$$y = \frac{3}{2}x + 3$$

FORMS OF LINES

Standard Form:
 $ax + by = c$

Slope-Intercept Form:

$$y = mx + b$$

$m = \text{slope}$

$b = \text{y-intercept}$

$$\begin{array}{r} x + y = -2 \\ -x \quad -x \\ \hline y = -x - 2 \end{array}$$

$$(-2, 0)$$

SUBSTITUTION

$$2x + 3y = 9$$

$$\begin{array}{r} 5x - y = 14 \\ \hline -5x \quad -5x \end{array} \leftarrow \text{Get a variable by itself}$$

$$\frac{-y}{1} = \frac{-5x + 14}{1}$$

$$y = 5x - 14$$

$$y = 5(3) - 14$$

$$y = 1$$

$$(3, 1)$$

$$2x + 3(5x - 14) = 9$$

$$2x + 15x - 42 = 9$$

$$17x - 42 = 9$$

$$\frac{\quad}{\quad} \frac{+42}{+42}$$

$$\frac{17x = 51}{17 \quad 17}$$

$$x = 3$$

ELIMINATION

$$5(1.5x + 2y = 20)$$

$$2(2.5x - 5y = -25)$$

~~$$7.5x + 10y = 100$$

$$+ 5x - 10y = -50$$

$$12.5x = 50$$

$$\frac{12.5x}{12.5} = \frac{50}{12.5}$$~~

$$x = 4$$

$$1.5(4) + 2y = 20$$

$$6 + 2y = 20$$

$$\begin{array}{r} -6 \\ \hline 2y = 14 \end{array}$$

$$\frac{2y}{2} = \frac{14}{2}$$

$$y = 7$$

$$(4, 7)$$

$$\begin{array}{r} 3x + y = 8 \\ + \quad 2x + y = 22 \\ \hline \end{array}$$

$$\frac{5x}{5} = \frac{30}{5}$$

$$x = 6$$

$$2(6) + y = 22$$

$$12 + y = 22$$

$$\begin{array}{r} 12 + y = 22 \\ -12 \quad -12 \\ \hline y = 10 \end{array}$$

$$(6, 10)$$