

# Linear Systems

---

## Key Ideas:

### 1. Types of Systems

- independent (different slopes, one solution – a point)
- inconsistent (same slope, no solution)
- dependent (same slope and y-intercept, infinite solutions)

### 2. Solving Systems

- graphing
- substitution strategy (isolate a variable)
- elimination strategy (cancel out one of the variables)

### 3. Word Problems

- write 2 equations (system) and solve

**\*Note: Watch your positive and negative signs!!**

#### 1. State the *type of system*:

$$\begin{aligned}x + y &= 3 \\ -2x - y &= 2\end{aligned}$$

$$\begin{aligned}y &= -x + 3 \\ y &= -2x - 2\end{aligned}$$

different slopes  
 $\therefore$  independent

2. Solve by **graphing**:

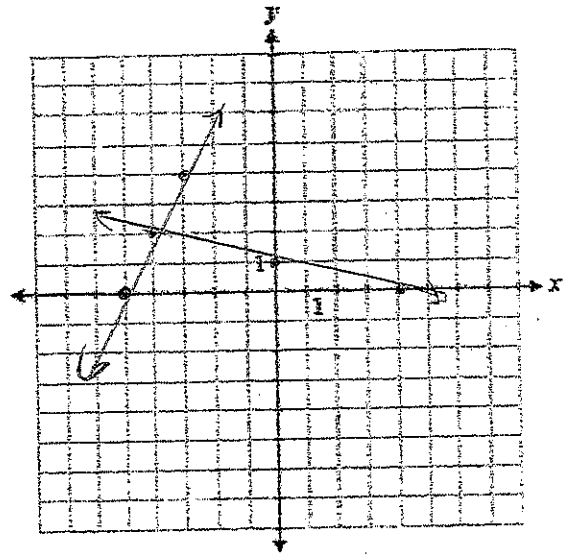
$$\begin{aligned} x + 4y &= 4 \quad (1) \\ -2x + y &= 10 \quad (2) \end{aligned}$$

$$\begin{aligned} (1) \quad 4y &= -x + 4 \\ y &= -\frac{1}{4}x + 1 \end{aligned}$$

$$(2) \quad y = 2x + 10$$

$$\begin{aligned} x\text{-int} \\ 0 &= 2x + 10 \\ -10 &= 2x \\ -5 &= x \end{aligned}$$

Sol'n  
 $(-4, 2)$



3. Solve by **substitution**:

$$\begin{aligned} 2x + 3y &= 11 \\ 4x - y &= -13 \end{aligned}$$

$$4x + 13 = y$$

$$2x + 3(4x + 13) = 11$$

$$2x + 12x + 39 = 11$$

$$14x = -28$$

$$x = -2$$

$$\begin{aligned} y &= 4(-2) + 13 \\ &= 5 \end{aligned}$$

$$(-2, 5)$$

4. Solve by **elimination**:

$$\begin{aligned} 2x + 3y &= 6 \\ 5x + 10y &= 20 \end{aligned}$$

$$x + 2y = 4$$

$$\times(-2)$$

$$-2x - 4y = -8$$

$$2x + 3y = 6$$

$$\begin{array}{r} -2x - 4y = -8 \\ 2x + 3y = 6 \\ \hline -y = -2 \\ y = 2 \end{array}$$

$$\begin{aligned} x + 2(2) &= 4 \\ x &= 0 \end{aligned}$$

$$(0, 2)$$

5. Edward has a jar containing **nickels** and **dimes**. The **total number** of coins is 300, and their **value** is \$23.25. How many of each coin is in the jar?

$$n + d = 300$$

$$0.05n + 0.10d = 23.25$$

$$n = 300 - d$$

$$0.05(300 - d) + 0.10d = 23.25$$

$$15 - 0.05d + 0.10d = 23.25$$

$$0.05d = 8.25$$

$$d = 165$$

$$n + 165 = 300$$

$$n = 135$$