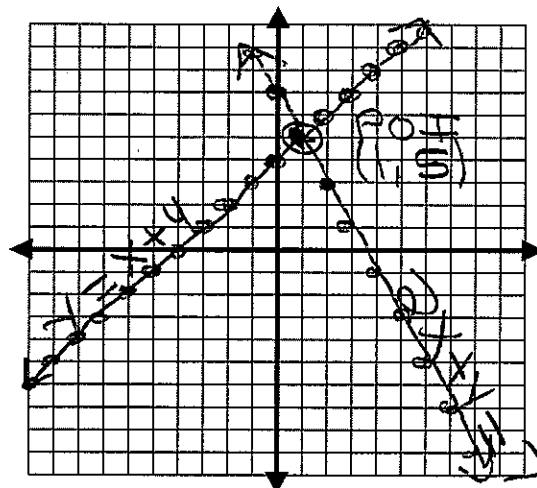


**DO NOW**

1. Solve the system of equations **graphically**

$$\begin{array}{l}
 2x + y = 7 \\
 y = x + 4 \\
 \hline
 2x + y = 7 \\
 -x - 4 = -x - 4 \\
 \hline
 x = -3 \\
 y = -3 + 4 = 1 \\
 \text{Solution } (-3, 1)
 \end{array}$$



**AIM: Solving systems of equations with the substitution method**

1. Solve the system of equations algebraically.

check (1, 5)

$$\begin{array}{l}
 2x + y = 7 \\
 2(1) + 5 = 7 \\
 2 + 5 = 7 \\
 7 = 7 \checkmark
 \end{array}$$

$$\begin{array}{l}
 y = x + 4 \\
 5 = 1 + 4 \\
 5 = 1 + 4 \\
 5 = 5 \checkmark
 \end{array}$$

$$\begin{array}{l}
 2x + y = 7 \\
 y = x + 4 \\
 \hline
 2x + y = 7 \\
 2x + (x + 4) = 7 \\
 2x + x + 4 = 7 \\
 3x + 4 = 7 \\
 -4 \quad -4 \\
 \hline
 3x = 3 \\
 \frac{3x}{3} = \frac{3}{3} \\
 x = 1 \\
 y = x + 4 \\
 y = 1 + 4 \\
 y = 5 \\
 \text{Solution } (1, 5)
 \end{array}$$

**Steps**

- 1) One variable has to be alone ( $x = \dots$  or  $y = \dots$ )
- 2) Substitute (replace) that variable in the other equation using parenthesis so that we have one equation with one variable.
- 3) Solve for the variable
- 4) Plug in your answer to find the other variable.
- 5) Write your answer as a P.O.I.
- 6) Check the P.O.I. in both equations (2 checks)

2. Solve the system of equations algebraically.

$$y = \boxed{2x - 1}$$
$$4x + 3y = 27$$

y is  $2x - 1$

$$4x + 3y = 27$$

$$4x + 3(2x - 1) = 27$$

$$4x + 6x - 3 = 27$$

$$10x - 3 = 27$$
$$\begin{array}{r} +3 \quad +3 \\ \hline \end{array}$$

$$\frac{10x}{10} = \frac{30}{10}$$

$$\boxed{x = 3}$$

$$y = 2x - 1$$

$$y = 2(3) - 1$$

$$y = 6 - 1$$

$$\boxed{y = 5}$$

**Solution (3, 5)**

3. Solve the system of equations algebraically.

$$4x - 2y = 10$$

$$y = \boxed{-2x - 1}$$

y is  $-2x + 1$

$$4x - 2y = 10$$

$$4x - 2(-2x - 1) = 10$$

$$4x + 4x + 2 = 10$$

$$8x + 2 = 10$$

$$\begin{array}{r} -2 \quad -2 \\ \hline \end{array}$$

$$\frac{8x}{8} = \frac{8}{8}$$

$$\boxed{x = 1}$$

$$y = -2x - 1$$

$$y = -2(1) - 1$$

$$y = -2 - 1$$

$$\boxed{y = -3}$$

**Solution (1, -3)**

4. Solve the system of equations algebraically.

$$y = 3x$$

$$y = 2x + 7$$

y is equal y  
 $y = y$

$$y_1 = y_2$$

$$\begin{array}{r} 3x = 2x + 7 \\ -2x \quad -2x \\ \hline \end{array}$$

$$\boxed{x = 7}$$

↓

$$y = 3x$$

$$y = 3(7)$$

$$\boxed{y = 21}$$

$$\boxed{\text{Solution } (7, 21)}$$

5. Solve the system of equations algebraically.

$$y = 8000 - 400x$$

$$y = 400x$$

y is equal to y

$$y_1 = y_2$$

$$\begin{array}{r} 8000 - 400x = 400x \\ + 400x \quad + 400x \\ \hline \end{array}$$

$$\frac{8000}{800} = \frac{800x}{800}$$

$$\boxed{10 = x}$$

↓

$$y = 400x$$

$$y = 400(10)$$

$$\boxed{y = 4,000}$$

$$\boxed{\text{Solution } (10, 4,000)}$$

6. Solve the system of equations algebraically.

$$y = -2x + 10$$

$$y \text{ is } -2x + 10$$

$$3x - y = 5$$

$$3x - \boxed{y} = 5$$

$$3x - (-2x + 10) = 5$$

$$3x + 2x - 10 = 5$$

$$5x - 10 = 5$$

$$+10 \quad +10$$

$$\underline{5x = 15}$$

$$\boxed{x = 3}$$

$$y = -2(3) + 10$$

$$y = -6 + 10$$

$$\boxed{y = 4}$$

**Solution (3, 4)**

7. Solve the system of equations algebraically.

$$x = 2 - y$$

$$x \text{ is } 2 - y$$

$$5x - 2y = 3$$

$$5\boxed{x} - 2y = 3$$

$$5(2 - y) - 2y = 3$$

$$10 - 5y - 2y = 3$$

$$10 - 7y = 3$$

$$-10 \quad -10$$

$$\underline{-7y = -7}$$

$$\boxed{y = 1}$$

$$x = 2 - y$$

$$x = 2 - 1$$

$$\boxed{x = 1}$$

**Solution (1, 1)**