

Name: Key

Class: _____

M8-U5: HW #4 - Solving Systems Using Substitution Date: _____

Solve by substitution. Tell whether the system has *no solution*, *one solution* or *infinitely many solutions*.

1. $\begin{cases} y = x + 4 \\ y = 3x \end{cases}$

$$\begin{array}{r} x + 4 = 3x \\ -x \quad -x \\ \hline 4 = 2x \\ \frac{4}{2} = \frac{2x}{2} \\ \boxed{2 = x} \end{array}$$

$$\begin{aligned} y &= (2) + 4 \\ &= 6 \\ y &= 3(2) \\ &= 6 \end{aligned}$$

$\boxed{P(2, 6)}$
one solution

2. $\begin{cases} x = -2y + 1 \\ x = y - 5 \end{cases}$

$$\begin{array}{r} -2y + 1 = y - 5 \\ +2y + 1 \quad +2y + 5 \\ \hline 6 = 3y \\ \frac{6}{3} = \frac{3y}{3} \\ \boxed{2 = y} \end{array}$$

$$\begin{aligned} x &= -2(2) + 1 \\ &= -4 + 1 \\ &= -3 \\ x &= (2) - 5 \\ &= -3 \end{aligned}$$

$\boxed{P(-3, 2)}$
one solution

3. $\begin{cases} y = 5x + 5 \\ y = 15x - 1 \end{cases}$

$$\begin{array}{r} 5x + 5 = 15x - 1 \\ -5x + 1 \quad -5x + 1 \\ \hline 6 = 10x \\ \frac{6}{10} = \frac{10x}{10} \\ \frac{3}{5} = x \end{array}$$

$$\begin{aligned} y &= 5\left(\frac{3}{5}\right) + 5 \\ &= 8 \\ y &= 15\left(\frac{3}{5}\right) - 1 \\ &= 8 \end{aligned}$$

$\boxed{P\left(\frac{3}{5}, 8\right)}$

4. $\begin{cases} y = x - 7 \\ 2x + y = 8 \end{cases}$

$$\begin{array}{r} 2x + (x - 7) = 8 \\ \quad \quad +7 \quad +7 \\ \hline 3x = 15 \\ \frac{3x}{3} = \frac{15}{3} \end{array}$$

$$\begin{aligned} x &= 5 \\ y &= (5) - 7 \\ &= -2 \end{aligned}$$

$\boxed{P(5, -2)}$
ck
 $2(5) + (-2) \stackrel{?}{=} 8$
 $10 - 2 \stackrel{?}{=} 8$
 $8 = 8 \checkmark$

$$5. \begin{cases} y = 3x - 6 \\ -3x + y = -6 \end{cases}$$

$$-3x + (3x - 6) = -6$$

$$-6 = -6$$

Identity,

infinitely many solutions
same eqn.

$$6. \begin{cases} x + 2y = 200 \\ x = y + 50 \end{cases}$$

$$(y + 50) + 2y = 200$$

$$\begin{array}{r} -50 \\ -50 \\ \hline 3y = 150 \\ \frac{3y}{3} = \frac{150}{3} \end{array}$$

$$y = 50$$

$$x = (50) + 50$$

$$x = 100$$

$$P(100, 50)$$

CK

$$(100) + 2(50) ? 200$$

$$100 + 100 ? 200$$

$$200 = 200 \checkmark$$

$$7. \begin{cases} 2x + y = 3 \\ y = 2x + 1 \end{cases}$$

$$2x + (2x + 1) = 3$$

$$4x + 1 = 3$$

$$\begin{array}{r} -1 \\ -1 \end{array}$$

$$\frac{4x + 1}{4} = \frac{3}{4}$$

$$x = \frac{1}{2}$$

$$P\left(\frac{1}{2}, 2\right)$$

$$y = 2\left(\frac{1}{2}\right) + 1$$

$$y = 2$$

CK

$$2\left(\frac{1}{2}\right) + 2 ? 3$$

$$1 + 2 ? 3$$

$$3 = 3 \checkmark$$

$$8. \begin{cases} y = \frac{3}{2}x \\ 6x - 4y = 1 \end{cases}$$

$$6x - 4\left(\frac{3}{2}x\right) = 1$$

$$6x - 6x = 1$$

$$0 \neq 1$$

No solution

parallel lines.