

## Solving Systems of Equations using Substitution Notes

Steps:

1. Solve one equation for  $x$  or  $y$ .
2. Substitute that into the other equation.
3. Solve for the only variable that remains in the equation.
4. Substitute the solution back into the  $x =$  or  $y =$  equation to solve for the remaining variable.
5. Check the solution in both equations of the system and write the answer as a coordinate point.

A.  $x = y + 1$   
 $x + 2y = -5$

$$y + 1 + 2y = -5$$

$$3y + 1 = -5$$

$$3y = -6$$

$$y = -2$$

$$x = -2 + 1$$
  
$$x = -1$$

$$(-2, -1)$$

B.  $3x + 5y = 2$   
 $x + 4y = -4$   $x = -4y - 4$

$$3(-4y - 4) + 5y = 2$$

$$-12y - 12 + 5y = 2$$

$$-7y - 12 = 2$$

$$-7y = 14$$

$$y = -2$$

$$x = -4(-2) - 4$$
  
$$(4, -2)$$

$$x = 8 - 4$$

$$x = 4$$

C.  $2x + y = 3$   $y = -2x + 3$   
 $4x + 2y = 6$

$$4x + 2(-2x + 3) = 6$$

$$4x - 4x + 6 = 6$$

$$6 = 6 \quad \checkmark$$

Infinite Solutions

D.  $2x + 2y = 8$

$$x + y = -2$$
  $y = -x - 2$

$$2x + 2(-x - 2) = 8$$

$$2x - 2x + 4 = 8$$

$$4 \neq 8 \quad \times$$

No Solution

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You Try:

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

$$2x - (x - 3) = 6$$

$$2x - x + 3 = 6$$

$$x + 3 = 6$$

$$x = 3$$

$$y = 3 - 3 \quad (3, 0)$$

$$y = 0$$

G.  $6x - 2y = -4$

$$-3x + y = 2 \quad y = 3x + 2$$

$$6x - 2(3x + 2) = -4$$

$$\cancel{6x} - \cancel{6x} - 4 = -4$$

$$-4 = -4 \quad \checkmark$$

Infinite Solutions

F.  $2x + 7y = -3$

$$3x + y = -14 \quad y = -3x - 14$$

$$2x + 7(-3x - 14) = -3$$

$$2x - 21x - 98 = -3$$

$$-19x - 98 = -3$$

$$-19x = 95$$

$$x = -5$$

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

$$y = 15 - 14$$

$$y = 1$$

$(-5, 1)$

H.  $3x - 6y = -6$

$$4x - 5y = 4$$

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

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

$$4x - 5(1 + \frac{1}{2}x) = 4$$

$$4x - 5 - \frac{5}{2}x = 4$$

$$1.5x - 5 = 4$$

$$1.5x = 9$$

$$x = 6$$

$$y = 1 + \frac{1}{2}(6)$$

$$y = 1 + 3$$

$$y = 4$$

$(6, 4)$