

# \* Show all your work! Check solutions!

Kuta Software - Infinite Algebra 1

Name (X, y)

## Solving Systems of Equations by Substitution

Date \_\_\_\_\_ Period \_\_\_\_\_

Solve each system by substitution.

\* means multiple ways, work may differ.

$$\begin{aligned} 1) \quad & y = (6x - 11) \\ & -2x - 3y = -7 \\ & -2x - 3(6x - 11) = -7 \\ & -2x - 18x + 33 = -7 \\ & -20x = -40 \\ & x = 2 \end{aligned}$$

$$\begin{aligned} & y = 6(2) - 11 \\ & y = 1 \end{aligned}$$

**(2, 1)**

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

$$\begin{aligned} & y = 4 - 1 \\ & y = 3 \end{aligned}$$

**(4, 3)**

$$\begin{aligned} 3) \quad & y = (-3x + 5) \\ & 5x - 4y = -3 \\ & 5x - 4(-3x + 5) = -3 \\ & 5x + 12x - 20 = -3 \\ & 17x = 17 \\ & x = 1 \end{aligned}$$

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

**(1, 2)**

$$\begin{aligned} 4) \quad & -3x - 3y = 3 \\ & y = (-5x - 17) \\ & -3x - 3(-5x - 17) = 3 \\ & -3x + 15x + 51 = 3 \\ & 12x = -48 \\ & x = -4 \end{aligned}$$

$$\begin{aligned} & y = -5(-4) - 17 \\ & y = 3 \end{aligned}$$

**(-4, 3)**

$$\begin{aligned} 5) \quad & y = (-2) \\ & 4x - 3y = 18 \\ & 4x - 3(-2) = 18 \\ & 4x + 6 = 18 \\ & 4x = 12 \\ & x = 3 \end{aligned}$$

**(3, -2)**

$$\begin{aligned} 6) \quad & y = (5x - 7) \\ & -3x - 2y = -12 \\ & -3x - 2(5x - 7) = -12 \\ & -3x - 10x + 14 = -12 \\ & -13x = -26 \\ & x = 2 \end{aligned}$$

$$\begin{aligned} & y = 5(2) - 7 \\ & y = 3 \end{aligned}$$

**(2, 3)**

$$\begin{aligned} * 7) \quad & -4x + y = 6 \\ & -5x - y = 21 \\ & -5x - (4x + 6) = 21 \\ & -9x - 6 = 21 \\ & -9x = 27 \\ & x = -3 \end{aligned}$$

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

**(-3, -6)**

$$\begin{aligned} 8) \quad & -7x - 2y = -13 \\ & x - 2y = 11 \\ & x = (2y + 11) \\ & -7(2y + 11) - 2y = -13 \\ & -14y - 77 - 2y = -13 \\ & -16y = 64 \\ & y = -4 \end{aligned}$$

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

**(3, -4)**

$$\begin{aligned} 9) \quad & -5x + y = -2 \\ & -3x + 6y = -12 \\ & -3x + 6(5x - 2) = -12 \\ & -3x + 30x - 12 = -12 \\ & 27x = 0 \\ & x = 0 \end{aligned}$$

$$\begin{aligned} & y = 5(0) - 2 \\ & y = -2 \end{aligned}$$

**(0, -2)**

$$\begin{aligned} 10) \quad & -5x + y = -3 \\ & 3x - 8y = 24 \\ & 3x - 8(5x - 3) = 24 \\ & 3x - 40x + 24 = 24 \\ & -37x = 0 \\ & x = 0 \end{aligned}$$

$$\begin{aligned} & y = 5(0) - 3 \\ & y = -3 \end{aligned}$$

**(0, -3)**

$$11) \begin{cases} x+3y=1 \\ -3x-3y=-15 \end{cases} \quad x=-(3y+1)$$

$$\begin{aligned} -3(-3y+1)-3y &= -15 & x &= -3(-2)+1 \\ 9y-3-3y &= -15 & x &= 7 \\ 6y &= -12 \\ y &= -2 \end{aligned}$$

$$\boxed{(7, -2)}$$

$$12) \begin{cases} -3x-8y=20 \\ -5x+y=19 \end{cases} \quad y=(5x+19)$$

$$\begin{aligned} -3x-8(5x+19) &= 20 \\ -3x-40x-152 &= 20 & y &= 5(-4)+19 \\ -43x &= 172 & y &= -1 \\ x &= -4 \end{aligned}$$

$$\boxed{(-4, -1)}$$

$$\star 13) \begin{cases} -3x+3y=4 \\ -x+y=3 \end{cases} \quad y=(x+3)$$

$$\begin{aligned} -3x+3(x+3) &= 4 \\ -3x+3x+9 &= 4 \\ 9 &= 4 \end{aligned}$$

No Solution  
 $\emptyset$

$$14) \begin{cases} -3x+3y=3 \\ -5x+y=13 \end{cases} \quad y=(5x+13) \quad y=5(-3)+13$$

$$\begin{aligned} -3x+3(5x+13) &= 3 \\ -3x+15x+39 &= 3 \\ 12x &= -36 \end{aligned}$$

$$\boxed{(-3, -2)}$$

$$15) \begin{cases} 6x+6y=-6 \\ 5x+y=-13 \end{cases} \quad y=(-5x-13)$$

$$\begin{aligned} 6x+6(-5x-13) &= -6 & y &= -5(-3)-13 \\ 6x-30x-78 &= -6 & y &= 2 \\ -24x &= 72 \\ x &= -3 \end{aligned}$$

$$\boxed{(-3, 2)}$$

$$16) \begin{cases} 2x+y=20 \\ 6x-5y=12 \end{cases} \quad y=(-2x+20)$$

$$\begin{aligned} 6x-5(-2x+20) &= 12 \\ 6x+10x-100 &= 12 \\ 16x &= 112 \\ x &= 7 \end{aligned}$$

$$\begin{aligned} y &= -2(7)+20 \\ y &= 6 \end{aligned}$$

$$\boxed{(7, 6)}$$

$$\star 17) \begin{cases} -3x-4y=2 \\ 3x+3y=-3 \end{cases} \div 3 \quad x+y=-1 \rightarrow x=(-y-1)$$

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

$$\boxed{(-2, 1)}$$

$$\star 18) \begin{cases} -2x+6y=6 \div 2 \\ -7x+8y=-5 \end{cases} \quad -x+3y=3 \rightarrow x=(3y-3)$$

$$\begin{aligned} -7(3y-3)+8y &= -5 & x &= 3(-2)-3 \\ -21y+21+8y &= -5 & x &= 6-3 \\ -13y &= -26 & x &= 3 \\ y &= 2 \end{aligned}$$

$$\boxed{(3, 2)}$$

$$\star 19) \begin{cases} -5x-8y=17 \\ 2x-7y=-17 \div 2 \end{cases} \quad x-3.5y=-8.5 \rightarrow x=(3.5y-8.5)$$

$$\begin{aligned} -5(3.5y-8.5)-8y &= 17 & x &= 3.5(1)-8.5 \\ -17.5y+42.5-8y &= 17 & x &= -5 \\ -25.5y &= -25.5 \\ y &= 1 \end{aligned}$$

$$\boxed{(-5, 1)}$$

$$20) \begin{cases} -2x-y=-9 \\ 5x-2y=18 \end{cases} \quad (2x+9)=y$$

$$\begin{aligned} 5x-2(2x+9) &= 18 \\ 5x+4x-18 &= 18 \\ 9x &= 36 \\ x &= 4 \end{aligned}$$

$$\boxed{(4, 1)}$$

$$\begin{aligned} -2(4)+9 &= y \\ 1 &= y \end{aligned}$$