

Solving Systems of Equations by Substitution

Date _____

Period _____

Solve each system by substitution.

1) $y = 6x - 11$

$-2x - 3y = -7$

$-2x - 3(6x - 11) = -7$

$-2x - 18x + 33 = -7$

$-20x + 33 = -7$

$-20x = -40$

$x = 2$

$y = 6(2) - 11$

$y = 12 - 11$

$y = 1$

$(2, 1)$

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

$y = x - 1$

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

$2x - 3x + 3 = -1$

$-x + 3 = -1$

$-x = -4$

$x = 4$

$y = 4 - 1$

$y = 3$

$(4, 3)$

3) $y = -3x + 5$

$5x - 4y = -3$

$5x - 4(-3x + 5) = -3$

$5x + 12x - 20 = -3$

$17x - 20 = -3$

$17x = 17$

$x = 1$

$y = -3(1) + 5$

$y = -3 + 5$

$y = 2$

$(1, 2)$

4) $-3x - 3y = 3$

$y = -5x - 17$

$-3x - 3(-5x - 17) = 3$

$-3x + 15x + 51 = 3$

$12x + 51 = 3$

$12x = -48$

$x = -4$

$y = -5(-4) - 17$

$y = 20 - 17$

$y = 3$

$(-4, 3)$

5) $y = -2$

$4x - 3y = 18$

$4x - 3(-2) = 18$

$4x + 6 = 18$

$4x = 12$

$x = 3$

$(3, -2)$

6) $y = 5x - 7$

$-3x - 2y = -12$

$-3x - 2(5x - 7) = -12$

$-3x - 10x + 14 = -12$

$-13x + 14 = -12$

$-13x = -26$

$x = 2$

$y = 5(2) - 7$

$y = 10 - 7$

$y = 3$

$(2, 3)$

7) $-4x + y = 6 \rightarrow y = 4x + 6$

$-5x - y = 21$

$-5x - (4x + 6) = 21$

$-4(-3) + y = 6$

$-5x - 4x - 6 = 21$

$12 + y = 6$

$-9x - 6 = 21$

$y = -6$

$-9x = 27$

$x = -3$

$(-3, -6)$

*8) $-7x - 2y = -13$

$x - 2y = 11$

$x = 2y + 11$

$-7(2y + 11) - 2y = -13$

$-14y - 77 - 2y = -13$

$-16y - 77 = -13$

$-16y = 64$

$y = -4$

$x - 2(-4) = 11$

$x + 8 = 11$

$x = 3$

$(3, -4)$

9) $-5x + y = -2 \rightarrow y = 5x - 2$

$-3x + 6y = -12$

$-3x + 6(5x - 2) = -12$

$-3x + 30x - 12 = -12$

$27x = 0$

$x = 0$

$(0, -2)$

$-5(0) + y = -2$

$0 + y = -2$

$y = -2$

10) $-5x + y = -3 \rightarrow y = 5x - 3$

$3x - 8y = 24$

$3x - 8(5x - 3) = 24$

$3x - 40x + 24 = 24$

$-37x + 24 = 24$

$-37x = 0$

$x = 0$

$-5(0) + y = -3$

$0 + y = -3$

$y = -3$

$(0, -3)$

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

$(7, -2)$

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

$(-4, -1)$

$$\begin{aligned}
 13) \quad -3x+3y &=4 \\
 -x+y &=3 \\
 y &=x+3 \\
 -3x+3(x+3) &=4 \\
 -3x+3x+9 &=4 \\
 9 &=4 \\
 \text{not true} & \quad \text{NO SOLN}
 \end{aligned}$$

$$\begin{aligned}
 14) \quad -3x+3y &=3 \\
 -5x+y &=13 \\
 y &=5x+13 \\
 -3x+3(5x+13) &=3 & -5(-3)+y=13 \\
 -3x+15x+39 &=3 & 15+y=13 \\
 12x+39 &=3 & y=-2 \\
 12x &=-36 \\
 x &=-3
 \end{aligned}$$

$(-3, -2)$

$$\begin{aligned}
 15) \quad 6x+6y &=-6 \\
 5x+y &=-13 \\
 y &=-5x-13 \\
 6x+6(-5x-13) &=-6 & 5(-3)+y=-13 \\
 6x-30x-78 &=-6 & -15+y=-13 \\
 -24x-78 &=-6 & y=2 \\
 -24x &=72 \\
 x &=-3
 \end{aligned}$$

$(-3, 2)$

$$\begin{aligned}
 16) \quad 2x+y &=20 \quad y=-2x+20 \\
 6x-5y &=12 \\
 6x-5(-2x+20) &=12 & 2(7)+y=20 \\
 6x+10x-100 &=12 & 14+y=20 \\
 16x &=112 & y=6 \\
 x &=7
 \end{aligned}$$

$(7, 6)$

$$\begin{aligned}
 17) \quad -3x-4y &=2 \\
 3x+3y &=-3 \\
 3y &=-3x-3 \\
 y &=-x-1 \\
 -3x-4(-x-1) &=2 \\
 -3x+4x+4 &=2 \\
 x+4 &=2 \\
 x &=-2 \\
 3(-2)+3y &=-3 \\
 -6+3y &=-3 \\
 3y &=3 \\
 y &=1
 \end{aligned}$$

$(-2, 1)$

$$\begin{aligned}
 18) \quad -2x+6y &=6 \quad 6y=2x+6 \\
 -7x+8y &=-5 \quad y=\frac{1}{3}x+1 \\
 -7x+8(\frac{1}{3}x+1) &=-5 & -2(3)+6y=6 \\
 -7x+\frac{8}{3}x+8 &=-5 & -6+6y=6 \\
 -\frac{13}{3}x+8 &=-5 & 6y=12 \\
 -\frac{13}{3}x &=-13 \quad \cdot \frac{3}{13} & y=2 \\
 x &=3
 \end{aligned}$$

$(3, 2)$

$$\begin{aligned}
 19) \quad -5x-8y &=17 \\
 2x-7y &=-17 \\
 2x &=7y-17 \\
 x &=\frac{7}{2}y-\frac{17}{2} \\
 -5(\frac{7}{2}y-\frac{17}{2})-8y &=17 & 2x-7(1)=-17 \\
 -\frac{35}{2}y+\frac{85}{2}-8y &=17 & 2x-7=-17 \\
 -\frac{51}{2}y+\frac{85}{2} &=17 & 2x=-10 \\
 -\frac{51}{2}y &=-\frac{51}{2} \quad \cdot \frac{2}{51} & x=-5 \\
 y &=1
 \end{aligned}$$

$(-5, 1)$

$$\begin{aligned}
 20) \quad -2x-y &=-9 \quad -y=2x-9 \\
 5x-2y &=18 \quad y=-2x+9 \\
 5x-2(-2x+9) &=18 & -2(4)-y=-9 \\
 5x+4x-18 &=18 & -8-y=-9 \\
 9x-18 &=18 & -y=-1 \\
 9x &=36 & y=1 \\
 x &=4
 \end{aligned}$$

$(4, 1)$