

Solving Systems of Equations by Substitution Worksheet

1) $y = 6x - 11$
 $-2x - 3y = -7$

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

3) $y = -3x + 5$
 ~~$-5x + 4y = -3$~~
 $5x - 4y = -3$

4) $y = 5x - 7$
 $-3x - 2y = -12$

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

6) $x = 1 - 3y$
 $3x + 3y = 15$

7) $-3x + 3y = 4$
 $x = y - 3$

Solving Systems of Equations by Substitution Worksheet

$$\begin{aligned} 8) \quad & -5x + y = -3 \\ & 3x - 8y = 24 \end{aligned}$$

$$\begin{aligned} 9) \quad & 3x + 8y = -20 \\ & -5x + y = 19 \end{aligned}$$

$$\begin{aligned} 10) \quad & -3x + 3y = 3 \\ & -5x + y = 13 \end{aligned}$$

$$\begin{aligned} 11) \quad & 6x + 6y = -6 \\ & 5x + y = -13 \end{aligned}$$

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

$$\begin{aligned} 13) \quad & 5x + 8y = -17 \\ & 2x - 7y = -17 \end{aligned}$$

$$\begin{aligned} 14) \quad & 2x - 6y = -6 \\ & -7x + 8y = -5 \end{aligned}$$

Solving Systems of Equations by Elimination Worksheet

1) $-4x - 2y = -12$
 $4x + 8y = -24$

2) $-6x + 5y = 1$
 $6x + 4y = -10$

3) $x - y = 11$
 $2x + y = 19$

4) $-4x + 9y = 9$
 $x - 3y = -6$

5) $5x + y = 9$
 $10x - 7y = -18$

6) $-3x + 7y = -16$
 $-9x + 5y = 16$

7) $16x - 10y = 10$
 $-8x - 6y = 6$

Solving Systems of Equations by Elimination Worksheet

$$\begin{aligned} 8) \quad & -7x - 8y = 9 \\ & -4x + 9y = -22 \end{aligned}$$

$$\begin{aligned} 9) \quad & 5x + 4y = -30 \\ & 3x - 9y = -18 \end{aligned}$$

$$\begin{aligned} 10) \quad & -4x - 2y = 14 \\ & -10x + 7y = -25 \end{aligned}$$

$$\begin{aligned} 11) \quad & 3x - 2y = 2 \\ & 5x - 5y = 10 \end{aligned}$$

$$\begin{aligned} 12) \quad & 5x + 4y = -14 \\ & 3x + 6y = 6 \end{aligned}$$

$$\begin{aligned} 13) \quad & -14 = -20y - 7x \\ & 10y + 4 = 2x \end{aligned}$$

$$\begin{aligned} 14) \quad & 3 + 2x - y = 0 \\ & -3 - 7y = 10x \end{aligned}$$

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1) $y = 6x - 11$
 $-2x - 3y = -7$

$(2, 1)$

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

$$\begin{aligned} y &= 6(2) - 11 \\ y &= 12 - 11 \\ y &= 1 \end{aligned}$$

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

$(-2, -1)$

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

$$\begin{aligned} y &= -2 + 1 \\ y &= -1 \end{aligned}$$

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

$(1, 2)$

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

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

4) $y = 5x - 7$
 $-3x - 2y = -12$

$(2, 3)$

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

$$\begin{aligned} y &= 5(2) - 7 \\ y &= 10 - 7 \\ y &= 3 \end{aligned}$$

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

$(-3, -6)$

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

$$\begin{aligned} y &= 4(-3) + 6 \\ y &= -12 + 6 \\ y &= -6 \end{aligned}$$

6) $x = 1 - 3y$
 $3x + 3y = 15$

$(7, -2)$

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

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

7) $-3x + 3y = 4$
 $x = y - 3$

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

No solution

$$\begin{aligned} -6y &= 12 \\ \underline{-6 \quad -6} & \\ y &= -2 \end{aligned}$$

Solving Systems of Equations by Substitution Worksheet

- 8) $-5x + y = -3$
 $3x - 8y = 24$
 $\rightarrow y = 5x - 3$
 $(0, -3)$
- 9) $3x + 8y = -20$
 $-5x + y = 19$
 $(-4, -1)$
- 10) $-3x + 3y = 3$
 $-5x + y = 13$
 $(-3, -2)$
- 11) $6x + 6y = -6$
 $5x + y = -13$
 $(-3, 2)$
- 12) $-3x - 4y = 2$
 $3x + 3y = -3$
 $(-2, 1)$
- 13) $5x + 8y = -17$
 $2x - 7y = -17$
 $(-5, 1)$
- 14) $2x - 6y = -6$
 $-7x + 8y = -5$
 $(3, 2)$
- Handwritten work for problem 8:*

$$\begin{array}{r} -5x + y = -3 \\ +5x \quad +5y \\ \hline \end{array}$$

$$\begin{array}{r} 3x - 8(5x - 3) = 24 \\ 3x - 40x + 24 = 24 \\ -24 \quad -24 \\ \hline -37x = 0 \\ -37 \quad -37 \\ \hline x = 0 \end{array}$$

$$\begin{array}{r} -5(0) + y = -3 \\ y = -3 \end{array}$$
- Handwritten work for problem 9:*

$$\begin{array}{r} -5x + y = 19 \\ +5x \quad +5y \\ \hline y = 5x + 19 \end{array}$$

$$\begin{array}{r} 3x + 8(5x + 19) = -20 \\ 3x + 40x + 152 = -20 \\ -152 \quad -152 \\ \hline 43x = -172 \\ 43 \quad 43 \\ \hline x = -4 \end{array}$$

$$\begin{array}{r} 3(-4) + 8y = -20 \\ -12 + 8y = -20 \\ +12 \quad +12 \\ \hline 8y = -8 \\ \frac{8y}{8} = \frac{-8}{8} \\ y = -1 \end{array}$$
- Handwritten work for problem 10:*

$$\begin{array}{r} -5x + y = 13 \\ +5x \quad +5y \\ \hline y = 5x + 13 \end{array}$$

$$\begin{array}{r} -3x + 3(5x + 13) = 3 \\ -3x + 15x + 39 = 3 \\ -39 \quad -39 \\ \hline 12x = -36 \\ 12 \quad 12 \\ \hline x = -3 \end{array}$$

$$\begin{array}{r} -5(-3) + y = 13 \\ 15 + y = 13 \\ -15 \quad -15 \\ \hline y = -2 \end{array}$$
- Handwritten work for problem 11:*

$$\begin{array}{r} 5x + y = -13 \\ -5x \quad -5y \\ \hline y = -5x - 13 \end{array}$$

$$\begin{array}{r} 6x + 6(-5x - 13) = -6 \\ 6x - 30x - 78 = -6 \\ +78 \quad +78 \\ \hline -24x = 72 \\ -24 \quad -24 \\ \hline x = -3 \end{array}$$

$$\begin{array}{r} 5(-3) + y = -13 \\ -15 + y = -13 \\ +15 \quad +15 \\ \hline y = 2 \end{array}$$
- Handwritten work for problem 12:*

$$\begin{array}{r} 3x + 3y = -3 \\ -3x \quad -3y \\ \hline 3y = -3x - 3 \\ \frac{3y}{3} = \frac{-3x - 3}{3} \\ y = -x - 1 \end{array}$$

$$\begin{array}{r} -3x - 4(-x - 1) = 2 \\ -3x + 4x + 4 = 2 \\ -4 \quad -4 \\ \hline x = -2 \end{array}$$

$$\begin{array}{r} -3(-2) - 4y = 2 \\ 6 - 4y = 2 \\ -6 \quad -6 \\ \hline -4y = -4 \\ \frac{-4y}{-4} = \frac{-4}{-4} \\ y = 1 \end{array}$$
- Handwritten work for problem 13:*

$$\begin{array}{r} 2x - 7y = -17 \\ +2y \quad +7y \\ \hline 2x = 7y - 17 \\ \frac{2x}{2} = \frac{7y - 17}{2} \\ x = 3.5y - 8.5 \end{array}$$

$$\begin{array}{r} 5(3.5y - 8.5) + 8y = -17 \\ 17.5y - 42.5 + 8y = -17 \\ +42.5 \quad +42.5 \\ \hline 25.5y = 25.5 \\ 25.5 \quad 25.5 \\ \hline y = 1 \end{array}$$

$$\begin{array}{r} 2x - 7(1) = -17 \\ 2x - 7 = -17 \\ +7 \quad +7 \\ \hline 2x = -10 \\ \frac{2x}{2} = \frac{-10}{2} \\ x = -5 \end{array}$$
- Handwritten work for problem 14:*

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

$$\begin{array}{r} -7(3y - 3) + 8y = -5 \\ -21y + 21 + 8y = -5 \\ -13y + 21 = -5 \\ -21 \quad -21 \\ \hline -13y = -26 \\ -13 \quad -13 \\ \hline y = 2 \end{array}$$

$$\begin{array}{r} 2x - 6(2) = -6 \\ 2x - 12 = -6 \\ +12 \quad +12 \\ \hline 2x = 6 \\ \frac{2x}{2} = \frac{6}{2} \\ x = 3 \end{array}$$

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1) $-4x - 2y = -12$
 $4x + 8y = -24$

$$\begin{array}{r} -4x - 2y = -12 \\ 4x + 8y = -24 \\ \hline 6y = -36 \\ \frac{6}{6} \quad \frac{-36}{6} \\ y = -6 \end{array}$$

$$\begin{array}{r} 4x + 8(-6) = -24 \\ 4x - 48 = -24 \\ +48 \quad +48 \\ \hline 4x = 24 \\ \frac{4x}{4} = \frac{24}{4} \quad x = 6 \end{array}$$

$(6, -6)$

2) $-6x + 5y = 1$
 $6x + 4y = -10$

$$\begin{array}{r} -6x + 5y = 1 \\ 6x + 4y = -10 \\ \hline 9y = -9 \\ \frac{9y}{9} = \frac{-9}{9} \\ y = -1 \end{array}$$

$$\begin{array}{r} 6x + 4(-1) = -10 \\ 6x - 4 = -10 \\ +4 \quad +4 \\ \hline 6x = -6 \\ \frac{6x}{6} = \frac{-6}{6} \\ y = -1 \end{array}$$

$(-1, -1)$

3) $x - y = 11$
 $2x + y = 19$

$$\begin{array}{r} x - y = 11 \\ 2x + y = 19 \\ \hline 3x = 30 \\ \frac{3x}{3} = \frac{30}{3} \\ x = 10 \end{array}$$

$$\begin{array}{r} 10 - y = 11 \\ -10 \quad -10 \\ \hline -y = 1 \\ \frac{-y}{-1} = \frac{1}{-1} \\ y = -1 \end{array}$$

$(10, -1)$

4) $-4x + 9y = 9$
 $x - 3y = -6 \rightarrow 3(x - 3y = -6)$

$$\begin{array}{r} -4x + 9y = 9 \\ 3x - 9y = -18 \\ \hline -x = -9 \\ \frac{-x}{-1} = \frac{-9}{-1} \\ x = 9 \end{array}$$

$$\begin{array}{r} -4(9) + 9y = 9 \\ -36 + 9y = 9 \\ +36 \quad +36 \\ \hline 9y = 45 \\ \frac{9y}{9} = \frac{45}{9} \quad y = 5 \end{array}$$

$(9, 5)$

5) $5x + y = 9$
 $10x - 7y = -18$

$$\begin{array}{r} 5x + y = 9 \rightarrow 7(5x + y = 9) \rightarrow 35x + 7y = 63 \\ 10x - 7y = -18 \\ \hline 45x = 45 \\ \frac{45x}{45} = \frac{45}{45} \\ x = 1 \end{array}$$

$$\begin{array}{r} 5(1) + y = 9 \\ 5 + y = 9 \\ -5 \quad -5 \\ \hline y = 4 \end{array}$$

$(1, 4)$

6) $-3x + 7y = -16$
 $-9x + 5y = 16 \rightarrow -3(-3x + 7y = -16) \rightarrow$

$$\begin{array}{r} 9x - 21y = 48 \\ -9x + 5y = 16 \\ \hline -16y = 64 \\ \frac{-16y}{-16} = \frac{64}{-16} \\ y = -4 \end{array}$$

$$\begin{array}{r} -3x + 7(-4) = -16 \\ -3x - 28 = -16 \\ +28 \quad +28 \\ \hline -3x = 12 \\ \frac{-3x}{-3} = \frac{12}{-3} \\ x = -4 \end{array}$$

$(-4, -4)$

7) $16x - 10y = 10$
 $-8x - 6y = 6 \rightarrow 2(-8x - 6y = 6) \rightarrow$

$$\begin{array}{r} 16x - 10y = 10 \\ -16x - 12y = 12 \\ \hline -22y = 22 \\ \frac{-22y}{-22} = \frac{22}{-22} \\ y = -1 \end{array}$$

$$\begin{array}{r} 16x - 10(-1) = 10 \\ 16x + 10 = 10 \\ -10 \quad -10 \\ \hline 16x = 0 \\ \frac{16x}{16} = \frac{0}{16} \\ x = 0 \end{array}$$

$(0, -1)$

Solving Systems of Equations by Elimination Worksheet

8) $-7x - 8y = 9 \rightarrow 4(-7x - 8y = 9) \rightarrow -28x - 32y = 36$
 $-4x + 9y = -22 \rightarrow -7(-4x + 9y = -22) \rightarrow 28x - 63y = 154$

$$\begin{array}{r} -28x - 32y = 36 \\ 28x - 63y = 154 \\ \hline -95y = 190 \end{array} \quad y = -2$$

 $(1, -2)$

9) $5x + 4y = -30 \rightarrow 9(5x + 4y = -30) \rightarrow 45x + 36y = -270$
 $3x - 9y = -18 \rightarrow 4(3x - 9y = -18) \rightarrow 12x - 36y = -72$

$$\begin{array}{r} 45x + 36y = -270 \\ 12x - 36y = -72 \\ \hline 57x = -342 \\ 57 \quad 57 \\ \hline x = -6 \end{array}$$

$$\begin{array}{r} 5(-6) + 4y = -30 \\ -30 + 4y = -30 \\ +30 \quad +30 \\ \hline 4y = 0 \\ \frac{4y}{4} \quad \frac{0}{4} \quad y = 0 \end{array}$$

 $(-6, 0)$

10) $-4x - 2y = 14 \rightarrow 5(-4x - 2y = 14) \rightarrow -20x - 10y = 70$
 $-10x + 7y = -25 \rightarrow -2(-10x + 7y = -25) \rightarrow 20x - 14y = 50$

$$\begin{array}{r} -20x - 10y = 70 \\ 20x - 14y = 50 \\ \hline -24y = 120 \\ \frac{-24y}{-24} \quad \frac{120}{-24} \\ \hline y = -5 \end{array}$$

$$\begin{array}{r} -4x - 2(-5) = 14 \\ -4x + 10 = 14 \\ -10 \quad -10 \\ \hline -4x = 4 \\ \frac{-4x}{-4} \quad \frac{4}{-4} \\ \hline x = -1 \end{array}$$

 $(-1, -5)$

11) $3x - 2y = 2 \rightarrow 5(3x - 2y = 2) \rightarrow 15x - 10y = 10$
 $5x - 5y = 10 \rightarrow -3(5x - 5y = 10) \rightarrow -15x + 15y = -30$

$$\begin{array}{r} 15x - 10y = 10 \\ -15x + 15y = -30 \\ \hline 5y = -20 \\ \frac{5y}{5} \quad \frac{-20}{5} \\ \hline y = -4 \end{array}$$

$$\begin{array}{r} 3x - 2(-4) = 2 \\ 3x + 8 = 2 \\ -8 \quad -8 \\ \hline 3x = -6 \\ \frac{3x}{3} \quad \frac{-6}{3} \quad x = -2 \end{array}$$

 $(-2, -4)$

12) $5x + 4y = -14 \rightarrow 3(5x + 4y = -14) \rightarrow 15x + 12y = -42$
 $3x + 6y = 6 \rightarrow -2(3x + 6y = 6) \rightarrow -6x - 12y = -12$

$$\begin{array}{r} 15x + 12y = -42 \\ -6x - 12y = -12 \\ \hline 9x = -54 \\ \frac{9x}{9} \quad \frac{-54}{9} \\ \hline x = -6 \end{array}$$

$$\begin{array}{r} 3(-6) + 6y = 6 \\ -18 + 6y = 6 \\ +18 \quad +18 \\ \hline 6y = 24 \\ \frac{6y}{6} \quad \frac{24}{6} \quad y = 4 \end{array}$$

 $(-6, 4)$

13) $-14 = -20y - 7x \rightarrow -7x - 20y = -14$
 $10y + 4 = 2x - 10y \rightarrow 2x - 10y = 4 \rightarrow -2(2x - 10y = 4) \rightarrow -4x + 20y = -8$

$$\begin{array}{r} -7x - 20y = -14 \\ -4x + 20y = -8 \\ \hline -11x = -22 \\ \frac{-11x}{-11} \quad \frac{-22}{-11} \\ \hline x = 2 \end{array}$$

$$\begin{array}{r} 10y + 4 = 2(2) \\ 10y + 4 = 4 \\ -4 \quad -4 \\ \hline 10y = 0 \\ \frac{10y}{10} \quad \frac{0}{10} \quad y = 0 \end{array}$$

 $(2, 0)$

14) $3 + 2x - y = 0 \rightarrow 2x - y = -3 \rightarrow 7(2x - y = -3) \rightarrow 14x - 7y = -21$
 $-3 - 7y = 10x + 7y \rightarrow 10x + 7y = -3$

$$\begin{array}{r} 14x - 7y = -21 \\ 10x + 7y = -3 \\ \hline 24x = -24 \\ \frac{24x}{24} \quad \frac{-24}{24} \\ \hline x = -1 \end{array}$$

$$\begin{array}{r} 3 + 2(-1) - y = 0 \\ 3 - 2 - y = 0 \\ 1 - y = 0 \\ +y \quad +y \\ \hline y = 1 \end{array}$$

 $(-1, 1)$