

Solving Systems of Equations by Substitution

Solve each system by substitution.

1) $y = 7x - 10$

$y = -3$

$$\begin{array}{r} 7x - 10 = -3 \\ +10 \quad +10 \end{array}$$

$$\frac{7x}{7} = \frac{7}{7}$$

$x = 1$

$(1, -3)$

2) $y = -8$

$y = -2x - 12$

$$\begin{array}{r} -8 = -2x - 12 \\ +12 \quad +12 \end{array}$$

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

$-2 = x$

$(-2, -8)$

3) $y = 6x$

$y = 5x + 7$

$$\begin{array}{r} 6x = 5x + 7 \\ -5x \quad -5x \end{array}$$

$x = 7$

$y = 6(7)$

$y = 42$

$(7, 42)$

4) $y = 9x - 9$

$y = 9$

$$\begin{array}{r} 9 = 9x - 9 \\ +9 \quad +9 \end{array}$$

$$\frac{18}{9} = \frac{9x}{9}$$

$2 = x$

$(2, 9)$

5) $y = -4$

$y = x - 8$

$$\begin{array}{r} -4 = x - 8 \\ +8 \quad +8 \end{array}$$

$4 = x$

$(4, -4)$

6) $y = 8x - 9$

$y = 7$

$$\begin{array}{r} 7 = 8x - 9 \\ +9 \quad +9 \end{array}$$

$$\frac{16}{8} = \frac{8x}{8}$$

$2 = x$

$(2, 7)$

7) $y = 6x - 14$

$y = -8x$

$$\begin{array}{r} -8x = 6x - 14 \\ -6x \quad -6x \end{array}$$

$$\begin{array}{r} -14x = -14 \\ -14 \quad -14 \end{array}$$

$x = 1$

$(1, -8)$

8) $y = 2x - 15$

$y = 5x$

$$\begin{array}{r} 5x = 2x - 15 \\ -2x \quad -2x \end{array}$$

$$\frac{3x}{3} = \frac{-15}{3}$$

$x = -5$

$y = 5(-5)$

$y = -25$

$(-5, -25)$

$$\begin{aligned}
 9) \quad y &= -8x \\
 2x + 4y &= 0 & \longrightarrow & y = -8(0) \\
 2x + 4(-8x) &= 0 & & y = 0 \\
 2x - 32x &= 0 \\
 -30x &= 0 \\
 \frac{-30x}{-30} &= \frac{0}{-30} \\
 x &= 0 & & (0, 0)
 \end{aligned}$$

$$\begin{aligned}
 10) \quad 6x + 7y &= 20 \\
 y &= 2x & \longrightarrow & y = 2(1) \\
 6x + 7(2x) &= 20 & & y = 2 \\
 6x + 14x &= 20 \\
 20x &= 20 \\
 \frac{20x}{20} &= \frac{20}{20} \\
 x &= 1 & & (1, 2)
 \end{aligned}$$

$$\begin{aligned}
 11) \quad -3x - 5y &= 6 \\
 y &= -3 \\
 -3x + 5(-3) &= 6 \\
 -3x + 15 &= 6 \\
 \frac{-3x + 15}{-15} &= \frac{6}{-15} \\
 -3x &= -9 \\
 \frac{-3x}{-3} &= \frac{-9}{-3} \\
 x &= 3 & & (3, -3)
 \end{aligned}$$

$$\begin{aligned}
 12) \quad 6x - 5y &= 22 \\
 y &= -8 \\
 6x + 5(-8) &= 22 \\
 6x + 40 &= 22 \\
 \frac{6x + 40}{-40} &= \frac{22}{-40} \\
 6x &= -18 \\
 \frac{6x}{6} &= \frac{-18}{6} \\
 x &= -3 & & (-3, -8)
 \end{aligned}$$

$$\begin{aligned}
 13) \quad y &= 2x \\
 3x + 3y &= -18 & \longrightarrow & y = 2(-2) \\
 3x + 3(2x) &= -18 & & y = -4 \\
 3x + 6x &= -18 \\
 9x &= -18 \\
 \frac{9x}{9} &= \frac{-18}{9} \\
 x &= -2 & & (-2, -4)
 \end{aligned}$$

$$\begin{aligned}
 14) \quad y &= 8x \\
 -5x - 5y &= 0 & \longrightarrow & y = 8(0) \\
 -5x + 5(8x) &= 0 & & y = 0 \\
 -5x + 40x &= 0 \\
 -45x &= 0 \\
 \frac{-45x}{-45} &= \frac{0}{-45} \\
 x &= 0 & & (0, 0)
 \end{aligned}$$

$$\begin{aligned}
 15) \quad y &= -3 \\
 -5x - 3y &= 14 \\
 -5x + 3(-3) &= 14 \\
 -5x + 9 &= 14 \\
 \frac{-5x + 9}{-9} &= \frac{14}{-9} \\
 -5x &= 5 \\
 \frac{-5x}{-5} &= \frac{5}{-5} \\
 x &= -1 & & (-1, -3)
 \end{aligned}$$

$$\begin{aligned}
 16) \quad y &= 3x \\
 -3x - y &= -24 & \longrightarrow & y = 3(4) \\
 -3x + 3x &= -24 & & y = 12 \\
 -6x &= -24 \\
 \frac{-6x}{-6} &= \frac{-24}{-6} \\
 x &= 4 & & (4, 12)
 \end{aligned}$$