

## Solving Systems of Equations using Elimination

**CLASS EXAMPLE:** Solve each system by elimination.

$$\begin{array}{r}
 1) \quad 4x + 6y = -20 \\
 + \quad 5x - 6y = 29 \\
 \hline
 9x = 9 \\
 \boxed{x=1} \\
 \uparrow \\
 (1, -4)
 \end{array}
 \rightarrow
 \begin{array}{r}
 4(1) + 6y = -20 \\
 4 + 6y = -20 \\
 -4 \quad -4 \\
 \hline
 6y = -24 \\
 \frac{6y}{6} = \frac{-24}{6} \\
 \boxed{y = -4}
 \end{array}$$

**CLASS EXAMPLE #2:**

$$\begin{array}{r}
 2) \quad 2x - 3y = -12 \\
 + \quad -2x + 3y = 15 \\
 \hline
 0 = +3 \\
 \text{No Solution}
 \end{array}$$

**Solve each system by elimination.**

$$\begin{array}{r}
 3) \quad -6x - 2y = 14 \\
 \quad -5x + 2y = 19
 \end{array}$$

$$\begin{array}{r}
 4) \quad -10x - 3y = 11 \\
 \quad -9x + 3y = -30
 \end{array}$$

$$\begin{array}{r}
 5) \quad -3x - 2y = 12 \\
 \quad 3x + 2y = -12
 \end{array}$$

$$\begin{array}{r}
 6) \quad 2x - y = 4 \\
 \quad 5x + y = -18
 \end{array}$$

**CLASS EXAMPLE #3: Solve each system by elimination.**

$$\begin{array}{r} 7) \quad 3x + 8y = 19 \\ \quad -3x + 10y = +17 \\ \hline \end{array}$$

$$\frac{18y}{18} = \frac{36}{18}$$
$$\boxed{y=2}$$

$$\star (1, 2)$$

$$\begin{array}{r} 3x + 8(z) = 19 \\ 3x + 16 = 19 \\ \hline -16 \quad -16 \\ \hline 3x = 3 \\ \boxed{x=1} \end{array}$$

**Solve each system by elimination.**

$$\begin{array}{r} 8) \quad 5x - 4y = 20 \\ \quad -5x + 7y = -20 \\ \hline \end{array}$$

$$\begin{array}{r} 9) \quad -x + 8y = -29 \\ \quad -x + 7y = -26 \end{array}$$

$$\begin{array}{r} 10) \quad -2x + 5y = -19 \\ \quad -7x + 5y = -29 \end{array}$$

$$\begin{array}{r} 11) \quad 2x - 3y = -29 \\ \quad -6x - 3y = -21 \end{array}$$

**CLASS EXAMPLE #4: Solve each system by elimination.**

$$\begin{array}{l}
 -2(2x + 5y = -25) \rightarrow -4x - 10y = 50 \\
 4x + 3y = -29 \\
 \hline
 -7y = 21 \\
 \frac{-7}{-7} \frac{21}{-7} \\
 \hline
 y = -3 \\
 \hline
 4x + 3(-3) = -29 \\
 4x - 9 = -29 \\
 +9 \quad +9 \\
 \hline
 4x = -20 \\
 \frac{4x}{4} = \frac{-20}{4} \\
 x = -5 \\
 \hline
 (-5, -3)
 \end{array}$$

**Solve each system by elimination.**

13)  $9x + 2y = 5$   
 $-18x - 3y = -3$

14)  $-14x - 7y = 14$   
 $-7x - 2y = 13$

15)  $-12x + 10y = 2$   
 $6x - 5y = 1$

16)  $-4x - 8y = -28$   
 $-2x + 2y = -2$

**CLASS EXAMPLE #5**

17) Micaela and Jaidee each improved their yards by planting rose bushes and shrubs. They bought their supplies from the same store. Micaela spent \$102 on 7 rose bushes and 8 shrubs. Jaidee spent \$72 on 4 rose bushes and 8 shrubs. What is the cost of one rose bush and the cost of one shrub?

$r = \text{cost of rose bush}$   $\$10.00$   
 $s = \text{cost of shrubs}$   $\$4.00$

$$\begin{array}{l}
 7r + 8s = 102 \\
 -4r + 8s = -72 \\
 \hline
 3r = 30 \\
 r = 10
 \end{array}$$

$$\begin{array}{l}
 7(10) + 8s = 102 \\
 70 + 8s = 102 \\
 -70 \quad -70 \\
 \hline
 8s = 32 \\
 s = 4
 \end{array}$$

$r = 10$

$8S - 32$   
 $S = 4$

**Write a system of equation for each problem, then solve using the elimination method.**

18) Jill and Brenda each improved their yards by planting hostas and shrubs. They bought their supplies from the same store. Jill spent \$154 on 10 hostas and 13 shrubs. Brenda spent \$66 on 10 hostas and 2 shrubs. Find the cost of one hosta and the cost of one shrub.

19) The school that Jimmy goes to is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 7 senior citizen tickets and 3 child tickets for a total of \$85. The school took in \$80 on the second day by selling 7 senior citizen tickets and 2 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

20) The senior classes at High School A and High School B planned separate trips to the water park. The senior class at High School A rented and filled 12 vans and 2 buses with 160 students. High School B rented and filled 2 vans and 7 buses with 200 students. Every van had the same number of students in it as did the buses. Find the number of students in each van and in each bus.

## Answers to Solving Systems of Equations using Elimination

- 1)  $(1, -4)$                       3)  $(-3, 2)$                       5) Infinite number of solutions  
7)  $(1, 2)$                           9)  $(5, -3)$                       11)  $(-1, 9)$                       13)  $(-1, 7)$   
15) No solution                      17) rose bush: \$10, shrub: \$4  
19) senior citizen ticket: \$10, child ticket: \$5