

Elimination Practice

$$1. \begin{array}{r} x - y = 1 \\ + x + y = -9 \\ \hline 2x = -8 \end{array}$$

$$\frac{2x}{2} = \frac{-8}{2}$$

$$x = -4$$

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

(-4, -5)

$$2. \begin{array}{r} p + q = -2 \\ + p - q = 8 \\ \hline 2p = 6 \end{array}$$

$$\frac{2p}{2} = \frac{6}{2}$$

$$p = 3$$

$$\begin{array}{r} p + q = -2 \\ 3 + q = -2 \\ -3 \quad -3 \\ \hline q = -5 \end{array}$$

$$3. \begin{array}{r} 4x + y = 23 \\ + 3x - y = 12 \\ \hline 7x = 35 \end{array}$$

$$\frac{7x}{7} = \frac{35}{7}$$

$$x = 5$$

$$\begin{array}{r} 4x + y = 23 \\ 4(5) + y = 23 \\ 20 + y = 23 \\ -20 \quad -20 \\ y = 3 \end{array}$$

(5, 3)

$$4. \begin{array}{r} 2x + 5y = -3 \\ - 2x + 2y = 6 \\ \hline 3y = -9 \end{array}$$

$$\frac{3y}{3} = \frac{-9}{3}$$

$$y = -3$$

$$\begin{array}{r} 2x + 5y = -3 \\ 2x + 5(-3) = -3 \\ 2x - 15 = -3 \\ +15 \quad +15 \\ \hline 2x = 12 \\ \frac{2x}{2} = \frac{12}{2} \\ x = 6 \end{array}$$

(6, -3)

$$5. \begin{array}{r} 3x + 2y = -1 \\ - 4x + 2y = -6 \\ \hline -x = 5 \end{array}$$

$$\frac{-x}{-1} = \frac{5}{-1}$$

$$x = -5$$

$$\begin{array}{r} 3x + 2y = -1 \\ 3(-5) + 2y = -1 \\ -15 + 2y = -1 \\ +15 \quad +15 \\ \hline 2y = 14 \\ \frac{2y}{2} = \frac{14}{2} \\ y = 7 \end{array}$$

(-5, 7)

$$6. \begin{array}{r} 5x + 3y = 22 \\ - 5x - 2y = 2 \\ \hline y = 20 \end{array}$$

$$\frac{y}{3} = \frac{20}{5}$$

$$y = 4$$

$$\begin{array}{r} 5x + 3y = 22 \\ 5x + 3(4) = 22 \\ 5x + 12 = 22 \\ -12 \quad -12 \\ \hline 5x = 10 \\ \frac{5x}{5} = \frac{10}{5} \\ x = 2 \end{array}$$

(2, 4)

$$\begin{array}{r} 7. \quad 5x + 2y = 7 \\ -2x + 2y = -14 \\ \hline \end{array}$$

$$\frac{7x}{7} = \frac{21}{7}$$

$$x = 3$$

$$\begin{array}{r} 5(3) + 2y = 7 \\ 15 + 2y = 7 \\ -15 \quad -15 \\ \hline 2y = -8 \\ \frac{2y}{2} = \frac{-8}{2} \\ y = -4 \end{array}$$

$$(3, -4)$$

$$\begin{array}{r} 8. \quad 3x - 9y = -12 \\ -3x - 15y = -6 \\ \hline \end{array}$$

$$\frac{6y}{6} = \frac{-6}{6}$$

$$y = -1$$

$$\begin{array}{r} 3x - 9(-1) = -12 \\ 3x + 9 = -12 \\ -9 \quad -9 \\ \hline 3x = -21 \\ \frac{3x}{3} = \frac{-21}{3} \\ x = -7 \end{array}$$

$$(-7, -1)$$

$$\begin{array}{r} 9. \quad -4c - 2d = -2 \\ -2c - 2d = -14 \\ \hline \end{array}$$

$$\frac{-6c}{-4} = \frac{12}{-6}$$

$$c = -2$$

$$\begin{array}{r} -4c - 2d = -2 \\ -4(-2) - 2d = -2 \\ 8 - 2d = -2 \\ -8 \quad -8 \\ \hline -2d = 10 \\ \frac{-2d}{-2} = \frac{10}{-2} \\ d = 5 \end{array}$$

$$(-2, 5)$$

$$\begin{array}{r} 10. \quad 2x - 6y = 6 \\ -2x + 3y = 24 \\ \hline \end{array}$$

$$\frac{-9y}{-9} = \frac{-18}{-9}$$

$$y = 2$$

$$\begin{array}{r} 2x - 6y = 6 \\ 2x - 6(2) = 6 \\ 2x - 12 = 6 \\ +12 \quad +12 \\ \hline 2x = 18 \\ \frac{2x}{2} = \frac{18}{2} \\ x = 9 \end{array}$$

$$(9, 2)$$

$$\begin{array}{r} 11. \quad 7x + 2y = 2 \\ -7x - 2y = -30 \\ \hline \end{array}$$

$$\frac{4y}{4} = \frac{32}{4}$$

$$y = 8$$

$$\begin{array}{r} 7x + 2(8) = 2 \\ 7x + 16 = 2 \\ -16 \quad -16 \\ \hline 7x = -14 \\ \frac{7x}{7} = \frac{-14}{7} \\ x = -2 \end{array}$$

$$(-2, 8)$$

$$\begin{array}{r} 12. \quad 4.25x - 1.28y = -9.2 \\ + x + 1.28y = 17.6 \\ \hline \end{array}$$

$$\frac{5.25x}{5.25} = \frac{8.4}{5.25}$$

$$x = 1.6$$

$$\begin{array}{r} 4.25(1.6) - 1.28y = -9.2 \\ 6.8 - 1.28y = -9.2 \\ -6.8 \quad -6.8 \\ \hline -1.28y = -16 \\ \frac{-1.28y}{-1.28} = \frac{-16}{-1.28} \\ y = 12.5 \end{array}$$

$$(1.6, 12.5)$$

More Challenging

Use elimination to solve each system of equations.

1. $5[x + y = -9]$ → $\begin{array}{r} 5x + 5y = -45 \\ 5x - 2y = 32 \end{array}$

$$\begin{array}{r} 5x + 5y = -45 \\ -5x - 2y = 32 \\ \hline 7y = -77 \\ \frac{7y}{7} = \frac{-77}{7} \\ y = -11 \end{array}$$

$$\begin{array}{r} x + y = -9 \\ x + (-11) = -9 \\ \hline x = 2 \end{array}$$

$(2, -11)$

2. $2[x - y = -13]$ → $\begin{array}{r} 3x + 2y = -9 \\ 2x - 2y = -26 \end{array}$

$$\begin{array}{r} 3x + 2y = -9 \\ 2x - 2y = -26 \\ \hline 5x = -35 \\ \frac{5x}{5} = \frac{-35}{5} \\ x = -7 \end{array}$$

$$\begin{array}{r} x - y = -13 \\ -7 - y = -13 \\ \hline -y = -6 \\ y = 6 \end{array}$$

$(-7, 6)$

3. $2[2x + 5y = 3]$ → $\begin{array}{r} 2x + 5y = 3 \\ -2x + 6y = -14 \end{array}$

$$\begin{array}{r} 2x + 5y = 3 \\ -2x + 6y = -14 \\ \hline 11y = -11 \\ \frac{11y}{11} = \frac{-11}{11} \\ y = -1 \end{array}$$

$$\begin{array}{r} -x + 3(-1) = -7 \\ -x - 3 = -7 \\ \hline -x = -4 \\ \frac{-x}{-1} = \frac{-4}{-1} \\ x = 4 \end{array}$$

$(4, -1)$

4. $2[2x + y = 3]$ → $\begin{array}{r} 4x + 2y = 6 \\ -4x - 4y = -8 \end{array}$

$$\begin{array}{r} 4x + 2y = 6 \\ -4x - 4y = -8 \\ \hline -2y = -2 \\ \frac{-2y}{-2} = \frac{-2}{-2} \\ y = 1 \end{array}$$

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

$(1, 1)$

5. $-2[4x - 2y = -14]$ → $\begin{array}{r} 4x - 2y = -14 \\ 3x - y = -8 \end{array}$

$$\begin{array}{r} 4x - 2y = -14 \\ -6x + 2y = 16 \\ \hline -2x = 2 \\ \frac{-2x}{-2} = \frac{2}{-2} \\ x = -1 \end{array}$$

$$\begin{array}{r} 3(-1) - y = -8 \\ -3 - y = -8 \\ \hline -y = -5 \\ \frac{-y}{-1} = \frac{-5}{-1} \\ y = 5 \end{array}$$

$(-1, 5)$

6. $3[2x + y = 0]$ → $\begin{array}{r} 6x + 3y = 0 \\ 5x + 3y = 2 \end{array}$

$$\begin{array}{r} 6x + 3y = 0 \\ 5x + 3y = 2 \\ \hline x = -2 \end{array}$$

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

$(-2, 4)$

7. $\begin{cases} 3[5x + 3y = -10] \\ 5[3x + 5y = -6] \end{cases}$

$$\begin{array}{r} -15x + 9y = -30 \\ -15x + 25y = -30 \\ \hline -16y = 0 \\ \hline y = 0 \end{array}$$

$5x + 3(0) = -10$
 $5x + 0 = -10$
 $5x = -10$
 $\frac{5}{5} \quad \frac{5}{5}$
 $x = -2$

$(-2, 0)$

8. $\begin{cases} 4[2x + 3y = 14] \\ 3[3x - 4y = 4] \end{cases}$

$$\begin{array}{r} 8x + 12y = 56 \\ 9x - 12y = 12 \\ \hline 17x = 68 \\ \hline x = 4 \end{array}$$

$2(4) + 3y = 14$
 $8 + 3y = 14$
 $-8 \quad -8$
 $3y = 6$
 $\frac{3}{3} \quad \frac{3}{3}$
 $y = 2$

$(4, 2)$

9. $\begin{cases} -2[2x - 3y = 21] \\ 3[5x - 2y = 25] \end{cases}$

$$\begin{array}{r} -4x + 6y = -42 \\ 15x - 6y = 75 \\ \hline 11x = 33 \\ \hline x = 3 \end{array}$$

$2(3) - 3y = 21$
 $6 - 3y = 21$
 $-6 \quad -6$
 $\frac{-3y}{-3} = \frac{15}{-3}$
 $y = -5$

$(3, -5)$

10. $\begin{cases} 5[3x + 2y = -26] \\ 2[4x - 5y = -4] \end{cases}$

$$\begin{array}{r} 15x + 10y = -130 \\ 8x - 10y = -8 \\ \hline 23x = -128 \\ \hline x = -6 \end{array}$$

$3(-6) + 2y = -26$
 $-18 + 2y = -26$
 $+18 \quad +18$
 $\frac{2y}{2} = \frac{-8}{-8}$
 $y = -4$

$(-6, -4)$

11. $\begin{cases} 2[3x - 6y = -3] \\ 3[2x + 4y = 30] \end{cases}$

$$\begin{array}{r} 6x - 12y = -6 \\ 6x + 12y = 90 \\ \hline 12x = 84 \\ \hline x = 7 \end{array}$$

$3(7) - 6y = -3$
 $21 - 6y = -3$
 $-21 \quad -21$
 $\frac{-6y}{-6} = \frac{-24}{-6}$
 $y = 4$

$(7, 4)$

12. $\begin{cases} 3[5x + 2y = -3] \\ -2[3x + 3y = 9] \end{cases}$

$$\begin{array}{r} 15x + 6y = -9 \\ -6x - 6y = -18 \\ \hline 9x = -27 \\ \hline x = -3 \end{array}$$

$3(-3) + 3y = 9$
 $-9 + 3y = 9$
 $+9 \quad +9$
 $\frac{3y}{3} = \frac{18}{3}$
 $y = 6$

$(-3, 6)$