Solving Systems of Equations by Elimination

Unit 4: Systems

Solve each of the following systems by using ELIMINATION:

1. $2x + 4y = 8$ $7x - 4y = -8$ (0, 2)	2. $8x + 8y = 19$ $-8x - 8y = -16$ No Solution
3. $-4x - 3y = -9$ $4x - 3y = 15$ (3, -1)	4. $-2x + 5y = -13$ $2x - 4y = 10$ (-1, -3)
5. $-x + 6y = 8$ $-2x - 6y = -20$ (4, 2)	6. $-2x + 6y = -20$ $4x + 6y = -14$ (1, -3)
7. $-4x + y = 10$ $-8x + y = 26$ (-4, -6)	8. $3x + 4y = -10$ $3x - 3y = 18$ (2, -4)
9. $-5x - 10y = 20$ $-5x - 7y = 5$ (6, -5)	10. $-2x + 5y = 6$ $-2x - 2y = 20$ (-8, -2)

11. $-8x + 8y = 0$ $x - 7y = 30$ $(-5, -5)$	12. $12x - 9y = 30$ $-3x - y = -14$ $(4, 2)$
13. $-11x + 7y = -26$ $x - 9y = -6$ $(3, 1)$	14. $-15x - 15y = 5$ $5x + 5y = 0$ No Solution
15. $15x - y = 0$ $-5x - 5y = 0$ $(0, 0)$	16. $-7x - 6y = -16$ $-2x - 4y = 16$ $(10, -9)$
17. $7x + 6y = -22$ $-2x + 4y = -28$ $(2, -6)$	18. $-3x + 7y = 12$ $-2x - 4y = 8$ $(-4, 0)$
19. $-7x - 4y = 13$ $-8x - 3y = 29$ $(-7, 9)$	20. $8x - 5y = -11$ $-3x - 4y = 10$ $(-2, -1)$

① $2x + 4y = 8$
$+ \; 7x - 4y = -8$

$\frac{9x}{9} = \frac{0}{9}$

$x = 0$

$2(0) + 4y = 8$
$0 + 4y = 8$
$\frac{4y}{4} = \frac{8}{4}$
$y = 2$

Solution
(0, 2)

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② $8x + 8y = 19$
$+ \; -8x - 8y = -16$

$0 = 3$

False Statement
Solution
NO SOLUTION

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③ $-4x - 3y = -9$
$+ \; 4x - 3y = 15$

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

$y = -1$

$4x - 3(-1) = 15$
$4x + 3 = 15$
$-3 \quad -3$
$\frac{4x}{4} = \frac{12}{4}$
$x = 3$

Solution
(3, -1)

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④ $-2x + 5y = -13$
$+ \; 2x - 4y = 10$

$y = -3$

$2x - 4(-3) = 10$
$2x + 12 = 10$
$-12 \quad -12$
$\frac{2x}{2} = \frac{-2}{2}$
$x = -1$

Solution
(-1, -3)

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⑤ $-x + 6y = 8$
$-2x - 6y = -20$

$\frac{-3x}{-3} = \frac{-12}{-3}$

$x = 4$

$(4) + 6y = 8$
$-4 + 6y = 8$
$+4 \quad +4$
$\frac{6y}{6} = \frac{12}{6}$
$y = 2$

Solution
(4, 2)

⑥ $[-2x + 6y = -20] \cdot -1$
$4x + 6y = -14$

$\Rightarrow$

$2x - 6y = 20$
$+ \; 4x + 6y = -14$
$\frac{6x}{6} = \frac{6}{6}$
$x = 1$

$4(1) + 6y = -14$
$4 + 6y = -14$
$-4 \quad -4$
$\frac{6y}{6} = \frac{-18}{6}$
$y = -3$

Solution
$(1, -3)$

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⑦ $[-4x + y = 10] \cdot -1$
$-8x + y = 26$

$\Rightarrow$

$4x - y = -10$
$+ \; -8x + y = 26$
$\frac{-4x}{-4} = \frac{16}{-4}$
$x = -4$

$-4(-4) + y = 10$
$16 + y = 10$
$-16 \quad -16$
$y = -6$

Solution
$(-4, -6)$

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⑧ $3x + 4y = -10$
$[3x - 3y = 18] \cdot -1$

$\Rightarrow$

$3x + 4y = -10$
$+ \; -3x + 3y = -18$
$\frac{7y}{7} = \frac{-28}{7}$
$y = -4$

$3x - 3(-4) = 18$
$3x + 12 = 18$
$-12 \quad -12$
$\frac{3x}{3} = \frac{6}{3}$
$x = 2$

Solution
$(2, -4)$

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⑨ $-5x - 10y = 20$
$[-5x - 7y = 5] \cdot -1$

$\Rightarrow$

$-5x - 10y = 20$
$+ \; 5x + 7y = -5$
$\frac{-3y}{-3} = \frac{15}{-3}$
$y = -5$

$-5x - 10(-5) = 20$
$-5x + 50 = 20$
$-50 \quad -50$
$\frac{-5x}{-5} = \frac{-30}{-5}$
$x = 6$

Solution
$(6, -5)$

(10) $-2x + 5y = 6$

$[-2x - 2y = 20] \cdot -1$ $\Rightarrow$

$$\begin{array}{r} -2x + 5y = 6 \\ +\ 2x + 2y = -20 \\ \hline \frac{7y}{7} = \frac{-14}{7} \end{array}$$

$y = -2$

$-2x - 2(-2) = 20$

$-2x + 4 = 20$

$-4 \quad -4$

$\frac{-2x}{-2} = \frac{16}{-2}$

$x = -8$

Solution $(-8, -2)$

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(11) $-8x + 8y = 0$

$[x - 7y = 30] \cdot 8$ $\Rightarrow$

$$\begin{array}{r} -8x + 8y = 0 \\ +\ 8x - 56y = 240 \\ \hline \frac{-48y}{-48} = \frac{240}{-48} \end{array}$$

$y = -5$

$x - 7(-5) = 30$

$x + 35 = 30$

$-35 \quad -35$

$x = -5$

Solution $(-5, -5)$

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(12) $12x - 9y = 30$

$[-3x - y = -14] \cdot 4$ $\Rightarrow$

$$\begin{array}{r} 12x - 9y = 30 \\ +\ -12x - 4y = -56 \\ \hline \frac{-13y}{-13} = \frac{-26}{-13} \end{array}$$

$y = 2$

$-3x - 2 = -14$

$+2 \quad +2$

$\frac{-3x}{-3} = \frac{-12}{-3}$

$x = 4$

Solution $(4, 2)$

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(13) $-11x + 7y = -26$

$[x - 9y = -6] \cdot 11$ $\Rightarrow$

$$\begin{array}{r} -11x + 7y = -26 \\ +\ 11x - 99y = -66 \\ \hline \frac{-92y}{-92} = \frac{-92}{-92} \end{array}$$

$y = 1$

$x - 9(1) = -6$

$x - 9 = -6$

$+9 \quad +9$

$x = 3$

Solution $(3, 1)$

(14) $-15x - 15y = 5$
$[5x + 5y = 0] \cdot 3$ $\Rightarrow$

$$\begin{array}{r} -15x - 15y = 5 \\ +\ 15x + 15y = 0 \\ \hline 0 \neq 5 \end{array}$$

False Statement

Solution

No Solution

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(15) $15x - y = 0$
$[-5x - 5y = 0] \cdot 3$ $\Rightarrow$

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

$\frac{-16y}{-16} = \frac{0}{-16}$

$y = 0$

$15x - 0 = 0$

$\frac{15x}{15} = \frac{0}{15}$

$x = 0$

Solution

$(0, 0)$

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(16) $[-7x - 6y = -16] \cdot -2$
$[-2x - 4y = 16] \cdot 7$ $\Rightarrow$

$$\begin{array}{r} 14x + 12y = 32 \\ +\ -14x - 28y = 112 \\ \hline -16y = 144 \end{array}$$

$\frac{-16y}{-16} = \frac{144}{-16}$

$y = -9$

$-2x - 4(-9) = 16$

$-2x + 36 = 16$

$-36 \quad -36$

$\frac{-2x}{-2} = \frac{-20}{-2}$

$x = 10$

Solution

$(10, -9)$

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(17) $[7x + 6y = -22] \cdot 2$
$[-2x + 4y = -28] \cdot 7$ $\Rightarrow$

$$\begin{array}{r} 14x + 12y = -44 \\ -14x + 28y = -196 \\ \hline 40y = -240 \end{array}$$

$\frac{40y}{40} = \frac{-240}{40}$

$y = -6$

$-2x + 4(-6) = -28$

$-2x - 24 = -28$

$+24 \quad +24$

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

$x = 2$

Solution

$(2, -6)$

(18) $[-3x + 7y = 12] \cdot -2$
$[-2x - 4y = 8] \cdot 3$

$\Rightarrow$

$6x - 14y = -24$
$+ \; -6x - 12y = 24$
$-26y = 0$
$\frac{-26y}{-26} = \frac{0}{-26}$
$y = 0$

$-2x - 4(0) = 8$
$-2x - 0 = 8$
$\frac{-2x}{-2} = \frac{8}{-2}$
$x = -4$

Solution
$(-4, 0)$

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(19) $[-7x - 4y = 13] \cdot -3$
$[-8x - 3y = 29] \cdot 4$

$\Rightarrow$

$21x + 12y = -39$
$-32x - 12y = 116$
$\frac{-11x}{-11} = \frac{77}{-11}$
$x = -7$

$-7(-7) - 4y = 13$
$49 - 4y = 13$
$-49 \quad -49$
$\frac{-4y}{-4} = \frac{-36}{-4}$
$y = 9$

Solution
$(-7, 9)$

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(20) $[8x - 5y = -11] \cdot 3$
$[-3x - 4y = 10] \cdot 8$

$\Rightarrow$

$24x - 15y = -33$
$-24x - 32y = 80$
$\frac{-47y}{-47} = \frac{47}{-47}$
$y = -1$

$8x - 5(-1) = -11$
$8x + 5 = -11$
$-5 \quad -5$
$\frac{8x}{8} = \frac{-16}{8}$
$x = -2$

Solution
$(-2, -1)$