3.2 Solving Systems by Elimination

Elimination Method:

1. Add the 2 equations together so that one of the variables cancels out.

2. Solve for the remaining variable.

3. Plug that number answer into one of the equations and solve for the other variable.

$3x + 5y = -16$
$+ \quad -3x + 2y = 9$

$7y = -7$

$\frac{7y}{7} = \frac{-7}{7}$

$y = -1$

$\left(-\frac{11}{3}, -1\right)$

$3x + 5(-1) = -16$
$3x - 5 = -16$
$+5 \quad +5$

$\frac{3x}{3} = \frac{-11}{3}$

$x = -\frac{11}{3}$

Use elimination to solve the system.

1. $2x + 5y = 12$
$-1 \cdot (2x + 5y) = (15) \cdot -1$

$2x + 5y = 12$
$-2x - 5y = -15$

$0 \neq -3$

no solution

2. $(-4.5x + 7.5y) = (9) \cdot 2$
$3 \cdot (3x - 5y) = (6) \cdot 3$

$-9x + 15y = -18$
$9x - 15y = 18$

$0 = 0$

infinitely many solutions

Use elimination to solve the system.

3. $3x - 4y = -1$
$-10 + 8y = -6x$

$-2 \cdot (3x - 4y) = (-1) \cdot -2$
$6x + 8y = 10$
$-6x + 8y = 2$
$6x + 8y = 10$
$\frac{16y}{16} = \frac{12}{16}$
$y = \frac{3}{4}$

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

4. $5x - 8 = 3y$
$10x - 6y = 18$

$-2 \cdot (5x - 3y) = (8) \cdot -2$
$10x - 6y = 18$
$-10x + 6y = -16$
$10x - 6y = 18$
$0 \neq 2$
no solution

Use elimination to solve the system.

5. $7b - 5c = 11$
$-4c - 2b = -14$

$4 \cdot (7b - 5c) = (11) \cdot 4$
$-5 \cdot (-2b - 4c) = (-14) \cdot -5$
$28b - 20c = 44$
$10b + 20c = 70$
$\frac{38b}{38} = \frac{114}{18}$
$b = 3$

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

6. $2(\frac{5}{2}x - y) = (5) \cdot 2$
$4y = 3x - 6$

$4y = 3(2) - 6$
$4y = 6 - 6$
$\frac{4y}{4} = \frac{0}{4}$
$y = 0$
$(2, 0)$

$2 \cdot (5x - 2y) = (10) \cdot 2$
$-3x + 4y = -6$
$10x - 4y = 20$
$-3x + 4y = -6$
$\frac{7x}{7} = \frac{14}{7}$
$x = 2$

Let x = # of cards Let y = # of bouquets

7. To raise funds, the Book Club is selling poetry cards and bouquets of flowers for Mother's Day. The club obtains the cards at a cost of $2 each and the bouquets at a cost of $3.50 each. They will sell the cards for $6 and the bouquets for $8. The club will spend $360 from their account, and their expected revenue is $900. How many cards and bouquets can be obtained and sold?

purchasing $2x + 3.50y = 360 · -3 → $-6x - 10.50y = -1080$

$ making $6x + 8y = 900$

$6x + 8y = 900$

$-2.50y = -180$

$\frac{-2.50y}{-2.50} = \frac{-180}{-2.50}$

$y = 72$

54 cards
72 bouquets

$6x + 8(72) = 900$

$6x + 576 = 900$

$-576 \quad -576$

$\frac{6x}{6} = \frac{324}{6}$

$x = 54$

Let x = # of 2-point shots y = # of 3-point shots

8. Greg is a star player on the basketball team. In one game, his field-goal total was 20 points, made up of 2-point and 3-point baskets. If Greg made a total of 9 baskets, how many of each type did he make?

points $2x + 3y = 20$

shots $-2 \cdot (x + y) = (9) \cdot -2$

$2x + 3y = 20$

$-2x - 2y = -18$

$y = 2$

7 2-point shots
2 3-point shots

$x + 2 = 9$

$x = 7$