3.4 Substitution Method – Solving Systems of Equations Solutions

Algebra 1

Practice

Create a system of equations for each problem, but don't solve. Identify each variable's meaning.

1. Maria and Carlos are selling wrapping paper for a school fundraise. Customers can buy rolls of plain wrapping paper and rolls of shiny wrapping paper. Maria sold 9 rolls of plain wrapping paper and 6 rolls of shiny wrapping paper for a total of \$204. Carlos sold 1 roll of plain wrapping paper and 8 rolls of shiny wrapping paper for a total of \$140.

p (variable) = cost of plain rolls (what the variable represents)

s (variable) = cost of shiny rolls (what the variable represents)

Equation 1: $9p + 6s = 204$

Equation 2: $p + 8s = 140$

2. A plane traveled 900 miles to Cleveland and back. (900 miles each way for a total of 1800 miles.) The trip there was with the wind and it took 9 hours. The trip back was into the wind and took 18 hours.

w (variable) = wind speed (what the variable represents)

p (variable) = plane speed (what the variable represents)

$d = rt$

Equation 1: $900 = (p + w) \cdot 9$

Equation 2: $900 = (p - w) \cdot 18$

Solve each system of equations using substitution.

3. $2x + 8y = -16$
$y = x - 12$

$2x + 8(x - 12) = -16$
$2x + 8x - 96 = -16$
$10x = 80$
$x = 8$

$y = (8) - 12$
$y = -4$

4. $C = 4r - 3$
$2C - 8r = -6$

$C = 4r - 3$

$2(4r - 3) - 8r = -6$
$8r - 6 - 8r = -6$
$-6 = -6$

Infinite solutions

5. $-y = -3x$
$6x + 3y =$

$y = -2+$

$6x + 3(-2+$
$6x - 6 + 9$
$15x -$
15

$y = -2 + 3($
$y = 2$

6. $4l + w = -2$
$4l = -8 - 4w$

$w = -2 - 4l$

$4l = -8 - 4(-2 - 4l)$
$4l = -8 + 8 + 16l$
$-12l = 0$
$l = 0$

$w = -2 - 4(0)$
$w = -2$

7. $c - 3d = 1$
$-3c = -9d$

$c = 1 + 3d$

$-3(1 + 3d) = -9d$
$-3 - 9d = -9d$
$-3 = 0$

no solution

8. $4m + 4n = -12$
$2n = -2 - m$

$m = -2 - 2n$

$4(-2 - 2n) + 4n = -12$
$-8 - 8n + 4n = -12$
$-8 - 4n = -12$
$-4n = -4$
$n = 1$

$m = -2 - 2(1)$
$m = -4$

9. $3x + 6y = -15$
$x = -5 - 2y$

$x = -5 - 2y$

$3(-5-2y)+6y=-15$
$-15-6y+6y=-15$
$-15=-15$

Infinite solutions

10. $a = 1 - 2h$
$8h + 4a = 6$

$a = 2h - 1$

$8h+4(2h-1)=6$
$8h+8h-4=6$
$16h=10$
$h=\frac{5}{8}$

$a=2(\frac{5}{8})-1$
$a=\frac{5}{4}-\frac{4}{4}$
$a=\frac{1}{4}$

11. $y = 4 + 2x$
$4x - 2y = 0$

$4x-2(4+2x)=0$
$4x-8-4x=0$
$-8=0$

no solution