Warm Up

Put the following equations into slope-intercept form.

$3x + y = 6$

$y = -3x + 6$

$\frac{3}{2}x - \frac{5}{2}y = 13$

$-\frac{5}{2}y = -\frac{3}{2}x + 13$

$y = \frac{3}{5}x - \frac{26}{5}$

$7x + \frac{7}{2}y = \frac{4}{3}$

$\frac{7}{2}y = -7x + \frac{4}{3}$

$y = -2x + \frac{8}{21}$

$\frac{3}{5}x - \frac{4}{3}y = -\frac{2}{3}$

$-\frac{4}{3}y = -\frac{3}{5}x - \frac{2}{3}$

$-4y = -\frac{9}{5}x - 2$

$y = \frac{9}{20}x + \frac{1}{2}$

$\frac{5}{9}x - \frac{5}{3}y = -\frac{5}{6}$

$-\frac{5}{3}y = -\frac{5}{9}x - \frac{5}{6}$

$-5y = -\frac{5}{3}x - \frac{5}{2}$

$y = \frac{1}{3}x + \frac{1}{2}$

$-\frac{13}{4}x + \frac{17}{2}y = \frac{14}{3}$

$\frac{17}{2}y = \frac{13}{4}x + \frac{14}{3}$

$17y = \frac{13}{2}x + \frac{28}{3}$

$y = \frac{13}{51}x + \frac{28}{51}$

Essential Question

How do you use substitution to solve a system of linear equations?

Goal: "I can. . .
Solve a system of equations using the substitution method."

Conceptual Question

If a system of equations has a solution, and that solution isn't infinite, the solution is always where?

point of intersection (x, y)

- point of intersection (x, y)

- common solution.

Example 1

With your table solve the following system without graphing.

$$y = 6x + 7$$

$$3x - 8y = 4$$

$3x - 48x - 56 = 4$

$-45x = 60$

$x = -\frac{4}{3}$

$y = 6(-\frac{4}{3}) + 7$

$y = -8 + 7$

$y = -1$

$(-\frac{4}{3}, -1)$

Solve the following systems using substitution.

a. $x = y + 6$

$x + y = 10$

$y + 6 + y = 10$

$2y = 4$

$y = 2$

$x = 2 + 6$

$x = 8$

$(8, 2)$

b. $y = 2x - 1$

$2x + 3y = -7$

$2x + 3(2x - 1) = -7$

$2x + 6x - 3 = -7$

$8x = -4$

$x = -\frac{1}{2}$

$y = 2(-\frac{1}{2}) - 1$

$y = -1 - 1$

$y = -2$

$(-\frac{1}{2}, -2)$

$2y = 4$ $x = 8$

$y = 2$ $(8, 2)$

$8x = -4$ $y = -2$

$x = -\frac{1}{2}$ $\left(-\frac{1}{2}, -2\right)$

Example 2

Solve the following systems of equations.

$y = 3x + 1$

$6x - 2y = -2$

$6x - 2(3x+1) = -2$

$6x - 6x - 2 = -2$

$-2 = -2$ ✓

∞

$5x - y = -4$

$y = 5x - 4$

$5x - (5x - 4) = -4$

$5x - 5x + 4 = -4$

$4 \neq -4$

NO SOL.

Solve the following systems of equations.

$x + y = -4$

$y = -x + 5$

$x - x + 5 = -4$

$5 \neq -4$

NO SOL.

$y = -2x + 5$

$2x + y = 5$

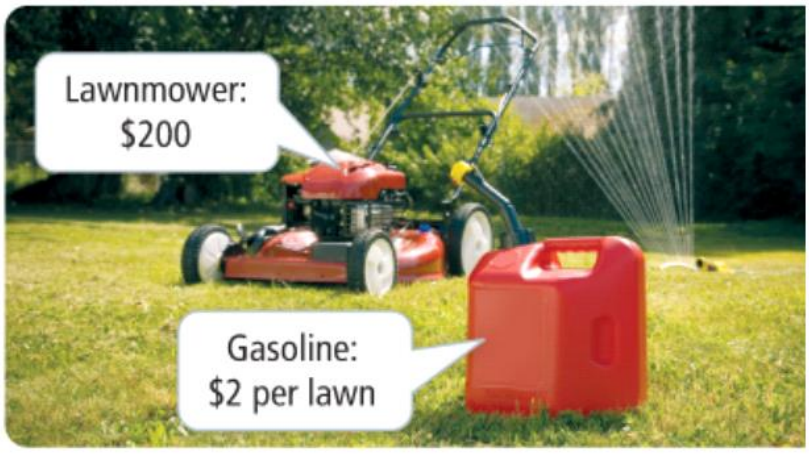
$2x - 2x + 5 = 5$

$5 = 5$ ✓

∞

Example 3

Rowan starts a lawn-mowing business. In their business, they have expenses and revenue. Rowan's expenses are the cost of the lawn mower and gas, and their revenue is $25 per lawn. At what point will Rowan's revenue exceed their expenses?



y = total $ x = # of lawns

$25/lawn $2/lawn $200

$y = 23x - 200$

$0 = 23x - 200$

$200 = 23x$

$\frac{200}{23} = \frac{23x}{23}$

$8.7 \approx x$

Happy Happy Funtime Amusement Park charges $12.50 for admission and then $0.75 per ride. River's Edge Awesome Sauce Park charges $18.50 for admission and then $0.50 per ride. For what number of rides is the cost the same at both parks?

$y = 0.75x + 12.50$ $y = 0.50 + 18.50$

$0.75x + 12.50 = 0.50x + 18.50$

$.25x = 6$

$x = 24$

24 rides

Homework

Pg. 155
11, 12, 17-22, 26-29, 37