

Skill check

Solve using elimination

$$x + 2y = 13$$

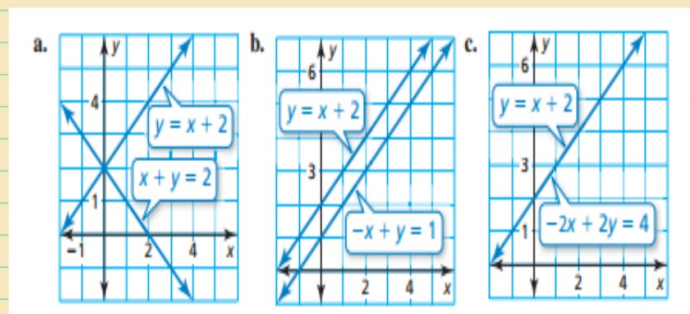
$$-x + y = 5$$

5-4 Special Systems

No solution

Many Solutions

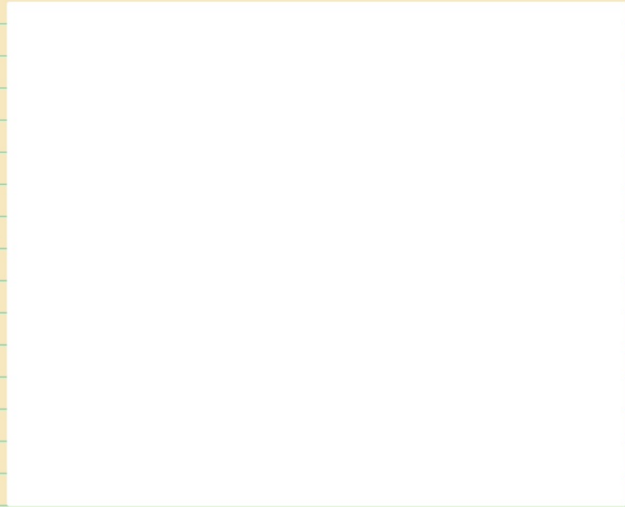
One Solution



Example 1
No solution

$$y = 2x + 1$$

$$y = 2x - 5$$



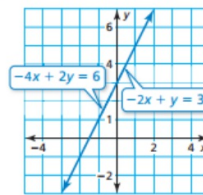
Example 2
Infinitely/Many solutions

$$-2x + y = 3$$

$$-4x + 2y = 6$$

Method 1 Solve by graphing.

Graph each equation.



Method 2 Solve by elimination.

Step 1 Multiply Equation 1 by -2 .

$$-2x + y = 3$$

Multiply by -2 .

$$4x - 2y = -6$$

Revised Equation 1

$$-4x + 2y = 6$$

$$-4x + 2y = 6$$

Equation 2

Step 2 Add the equations.

$$4x - 2y = -6$$

Revised Equation 1

$$\underline{-4x + 2y = 6}$$

Equation 2

$$0 = 0$$

Add the equations.

► The equation $0 = 0$ is always true. So, the solutions are all the points on the line $-2x + y = 3$. The system of linear equations has infinitely many solutions.

Solve the system of linear equations.

1. $x + y = 3$

2. $y = -x + 3$

$$2x + 2y = 6$$

$$2x + 2y = 4$$

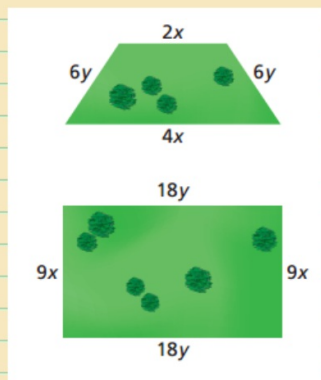
3. $x + y = 3$

4. $y = -10x + 2$

$$x + 2y = 4$$

$$10x + y = 10$$

The perimeter of the trapezoidal piece of land is 48 kilometers. The perimeter of the rectangular piece of land is 144 kilometers. Write and solve a system of linear equations to find the values of x and y .



Perimeter of trapezoid

$$2x + 4x + 6y + 6y = 48$$

$$6x + 12y = 48 \quad \text{Equation 1}$$

System $6x + 12y = 48 \quad \text{Equation 1}$

$$18x + 36y = 144 \quad \text{Equation 2}$$

Perimeter of rectangle

$$9x + 9x + 18y + 18y = 144$$

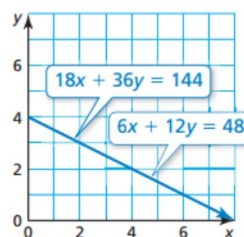
$$18x + 36y = 144 \quad \text{Equation 2}$$

Method 1 Solve by graphing.

Graph each equation.

The lines have the same slope and the same y -intercept. So, the lines are the same.

In this context, x and y must be positive. Because the lines are the same, all the points on the line in Quadrant I are solutions of both equations.



► So, the system of linear equations has infinitely many solutions.

Method 2 Solve by elimination.

Multiply Equation 1 by -3 and add the equations.

$$6x + 12y = 48$$

Multiply by -3 .

$$-18x - 36y = -144 \quad \text{Revised Equation 1}$$

$$18x + 36y = 144$$

$$18x + 36y = 144 \quad \text{Equation 2}$$

$$0 = 0 \quad \text{Add the equations.}$$

► The equation $0 = 0$ is always true. In this context, x and y must be positive. So, the solutions are all the points on the line $6x + 12y = 48$ in Quadrant I. The system of linear equations has infinitely many solutions.

Solve the system of linear equations.

1. $y = 4x - 2$

$y = 4x - 4$

2. $x - y = -2$

$-4x + 4y = 8$

3. A small fruit basket costs \$8 and a large fruit basket costs \$20. The small basket contains 6 apples and 4 pears. The large basket contains 18 apples and 12 pears. Write a system of linear equations to represent this situation. Can you find the unit price of each fruit? Explain.