

Solve the equation for y , so it is in slope-intercept form.

1. $x + y = 4$

$$y = -x + 4$$

2. $-2x + y = 10$

$$y = 2x + 10$$

3. $-3x + y = 12$

$$y = 3x + 12$$

4. $2x - 5y = -1$

$$-5y = -2x - 1$$

$$y = \frac{2}{5}x + \frac{1}{5}$$

5. $6x - y = 11$

$$-y = -6x + 11$$

$$y = 6x - 11$$

6. $-\frac{2}{5}x + y = -2$

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

Warm Up

Describe the transformation from the graph of f to the graph of g .

1. $f(x) = -\frac{1}{5}x - 2$; $g(x) = f(x) + 4$

2. $f(x) = -4x - 5$; $g(x) = f(x) - 1$

3. $f(x) = x + 1$; $g(x) = f(x) - 6$

Cumulative Warm Up

Essential Question

Can a system of linear equations have no solution or infinitely many solutions?

Essential Question

*** Literal Equations:**

Solve for the specified variable.

In this case we turn each equation into

$$y = mx + b$$

↑ ↑
Slope y-Intercept***Skip for now***

or

*** Use graphing software to show transformations.****What you will learn:***** determine the number of solutions of linear systems***** Use linear systems to solve real-life problems.**

Work with a partner. You invest \$450 for equipment to make skateboards. The materials for each skateboard cost \$20. You sell each skateboard for \$20.

a. Write the cost and revenue equations. Then copy and complete the table for your cost C and your revenue R .

x (skateboards)	0	1	2	3	4	5	6	7	8	9	10
C (dollars)	450	470	490	510	530	550	570	590	610	630	650
R (dollars)	0	20	40	60	80	100	120	140	160	180	200

b. When will your company break even? What is wrong?

Never: both cost and revenue increase at the same rate, but have different initial values.

$$C = 450 + 20x$$

$$R = 20x$$

* Notice the Slope of each.

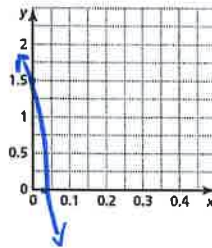
Exploration 1

Work with a partner. A necklace and matching bracelet have two types of beads.

The necklace has 40 small beads and 6 large beads and weighs 10 grams. The bracelet has 20 small beads and 3 large beads and weighs 5 grams. The threads holding the beads have no significant weight.

a. Write a system of linear equations that represents the situation. Let x be the weight (in grams) of a small bead and let y be the weight (in grams) of a large bead.

b. Graph the system in the coordinate plane shown. What do you notice about the two lines?



c. Can you find the weight of each type of bead?

Explain your reasoning.

$$40x + 6y = 10$$

$$20x + 3y = 5$$

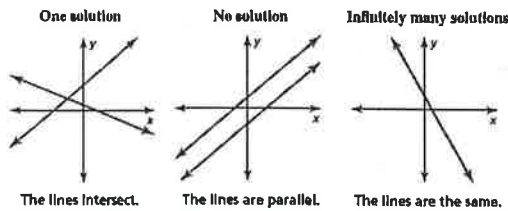
Check Slopes (rate of change)

Exploration 2

Core Concept

Solutions of Systems of Linear Equations

A system of linear equations can have one solution, no solution, or infinitely many solutions.



One solution: different slopes, may be (not) different y -intercepts

No solution: same slope, different y -intercept

Infinite solutions: same slope, same y -intercept (same line)

Core Concept

Solve the system of linear equations.

$y = 2x + 1$ Equation 1

$y = 2x - 5$ Equation 2

use substitution

$$\begin{array}{r} 2x + 1 = 2x - 5 \\ -2x \quad -2x \end{array}$$

$1 = -5 \leftarrow$ Is this ever true?

Example 1

Same slope - parallel lines

No solution.

Solve the system of linear equations.

$-2x + y = 3$ Equation 1

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

$y = 2x + 3$

$+4x \quad +4x$

$$\frac{2y}{2} = \frac{4x}{2} + \frac{6}{2}$$

$y = 2x + 3$

Example 2

Infinite solutions - same line

Solve the system of linear equations.

1. $x + y = 3$

2. $y = -x + 3$

$2x + 2y = 6$

$2x + 2y = 4$

3. $x + y = 3$


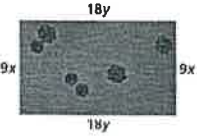
4. $y = -10x + 2$

$x + 2y = 4$

$10x + y = 10$

* Student practice

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 .

Infinite many solutions

Example 3

trap: $2x + 4x + 6y + 6y = 48$
 $6x + 12y = 48$

rectangle: $9x + 9x + 18y + 18y = 144$
 $18x + 36y = 144$

System: $6x + 12y = 48 \quad (-3)$
 $18x + 36y = 144$
 $-18x - 36y = -144$
 $0 = 0$
 Is this \uparrow true?

5. WHAT IF? What happens to the solution in Example 3 when the perimeter of the trapezoidal piece of land is 96 kilometers? Explain.

Check the slopes and see what happens?

* The system would have no solution; the lines still have the same slope but different y -intercepts so the lines are parallel.

Monitoring Progress 5

Exit Ticket: Write a system of equations that has no solution.

Write a system of equations that has infinitely many solutions.