

3.1

Solve Linear Systems by Graphing

Goal • Solve systems of linear equations.

Your Notes

VOCABULARY

System of two linear equations

Solution of a system

Consistent

Inconsistent

Independent

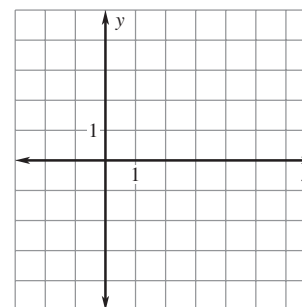
Dependent

Example 1 Solve a system graphically

Graph the system and estimate the solution. Then check the solution algebraically.

$$4x + 2y = 4 \quad \text{Equation 1}$$

$$2x - 3y = 10 \quad \text{Equation 2}$$



Solution

Graph both equations. The lines appear to intersect at (____, ____). Check this algebraically as follows:

Equation 1

$$4x + 2y = 4$$

$$4(\quad) + 2(\quad) \stackrel{?}{=} 4$$
$$\quad = 4 \checkmark$$

Equation 2

$$2x - 3y = 10$$

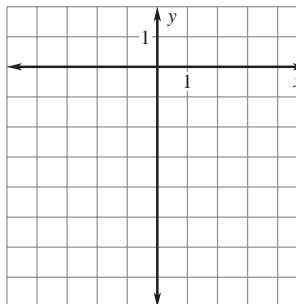
$$2(\quad) - 3(\quad) \stackrel{?}{=} 10$$
$$\quad = 10 \checkmark$$

Remember to check the visual solution in *both* equations.

Your Notes

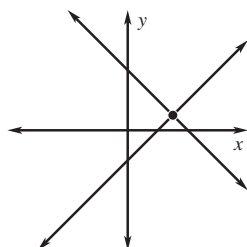
✓ Checkpoint Graph the linear system and estimate the solution. Then check the solution algebraically.

1. $4x + y = -2$
 $-6x - 3y = 12$



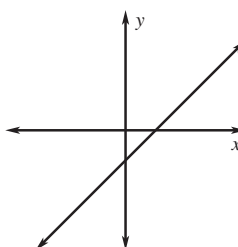
NUMBER OF SOLUTIONS OF A LINEAR SYSTEM

Exactly one solution



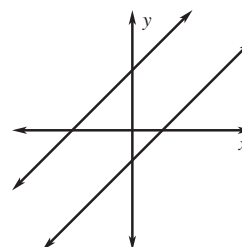
Lines intersect at _____
 consistent and _____

Infinitely many solutions



Lines _____;
 consistent and _____

No solutions



Lines are _____;

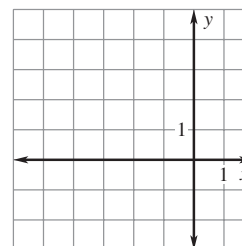
Example 2 Solve a system with many solutions

Solve the system. Then classify the system as *consistent and independent*, *consistent and dependent*, or *inconsistent*.

$-2x + y = 4$ Equation 1

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

The graphs of the equations are _____. So, each point on the line is a solution, and the system has _____ solutions. Therefore, the system is _____.



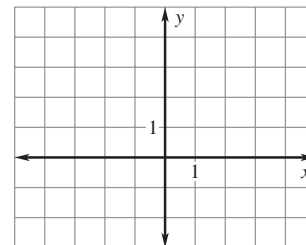
Your Notes

Example 3 Solve a system with no solution

Solve the system. Then classify the system as *consistent and independent*, *consistent and dependent*, or *inconsistent*.

$-2x + 4y = 8$ Equation 1

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

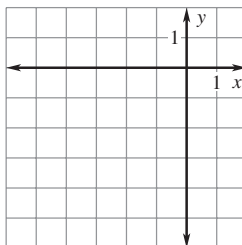


Solution

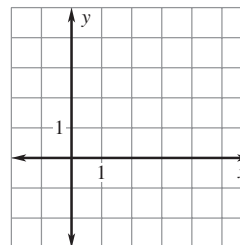
The graphs of the equations are two parallel lines. Therefore, the system is inconsistent.

✔ **Checkpoint** Solve the system. Then classify the system as *consistent and independent*, *consistent and dependent*, or *inconsistent*.

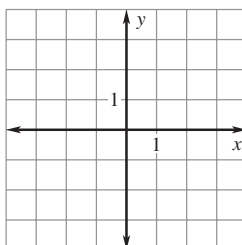
2. $3x - 2y = -6$
 $-5x + 4y = 8$



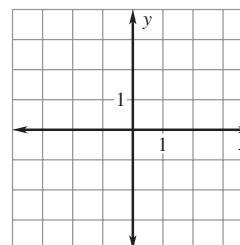
3. $-x - 2y = -5$
 $-2x - 4y = -10$



4. $6x - 3y = 12$
 $6x - 3y = -6$



5. $x + y = 2$
 $4x - 3y = 1$

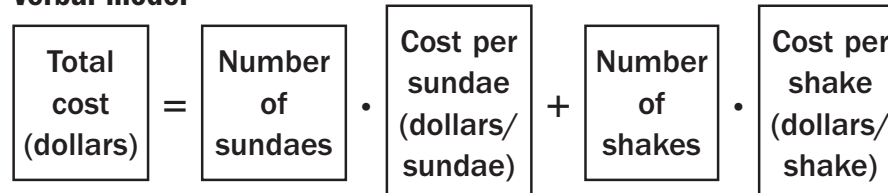


Your Notes

Example 4 Writing and using a linear system

Ice Cream Shop At an ice cream shop, one customer pays \$9 for 2 sundaes and 2 milkshakes. A second customer pays \$13 for 2 sundaes and 4 milkshakes. How much do each sundae and milkshake cost?

Verbal model



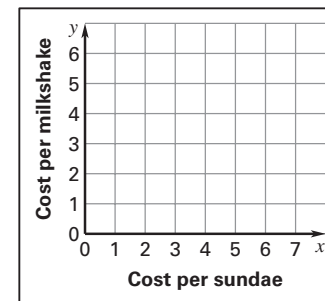
_____ = _____ • x + _____ • y **Equation 1 (Customer 1)**

_____ = _____ • x + _____ • y **Equation 2 (Customer 2)**

Graph the equations

_____ x + _____ y = _____ and
 _____ x + _____ y = _____.

The lines appear to intersect at about the point (_____, _____).



Check this algebraically.

_____ (_____) + _____ (_____) = _____ + _____ = 9 ✓ **Equation 1 checks.**

_____ (_____) + _____ (_____) = _____ + _____ = 13 ✓ **Equation 2 checks.**

The solution is (_____, _____). So, each sundae costs \$ _____ and each milkshake costs \$ _____.

✓ **Checkpoint** Complete the following exercise.

Homework

6. In Example 4, how much do each sundae and milkshake cost if the first customer pays \$7 and the second customer pays \$10?

