

## Lesson 7-1

### Example 1 Number of Solutions

Use the graph at the right to determine whether each system has *no solution*, *one solution*, or *infinitely many solutions*.

a.  $y = 2x + 2$

$4x - 2y = 10$

Since the graphs of  $y = 2x + 2$  and  $4x - 2y = 10$  are parallel, there are no solutions.

b.  $y = 2x - 5$

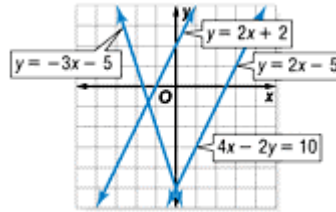
$4x - 2y = 10$

Since the graphs of  $y = 2x - 5$  and  $4x - 2y = 10$  coincide, there are infinitely many solutions.

c.  $y = -3x - 5$

$y = 2x + 2$

Since the graphs of  $y = -3x - 5$  and  $y = 2x + 2$  intersect, there is one solution.



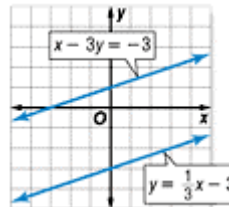
### Example 2 Solve a System of Equations

Graph each system of equations. Then determine whether the system has *no solution*, *one solution*, or *infinitely many solutions*. If the system has one solution, name it.

a.  $y = \frac{1}{3}x - 3$

$x - 3y = -3$

The graphs of the equations are parallel lines. Since they do not intersect, there are no solutions to this system of equations. Notice that the lines have the same slope but different  $y$ -intercepts. Recall that a system of equations that has no solution is said to be *inconsistent*.



b.  $x - y = 3$

$2x - y = -1$

The graphs appear to intersect at the point with coordinates  $(-4, -7)$ . Check this estimate by replacing  $x$  with  $-4$  and  $y$  with  $-7$  in each equation.

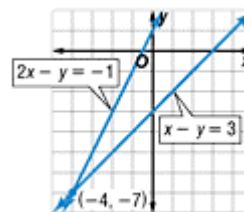
**Check**  $x - y = 3$   $2x - y = -1$

$-4 - (-7) = 3$   $2(-4) - (-7) = -1$

$-4 + 7 = 3$   $-8 + 7 = -1$

$3 = 3$  ✓  $-1 = -1$  ✓

The solution is  $(-4, -7)$ .



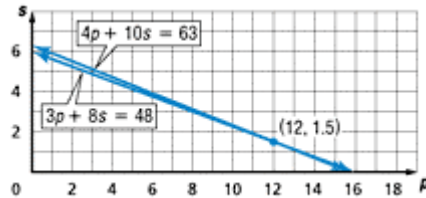
### Example 3 Write and Solve a System of Equations

Alexis bought pizza and soda for the ski club meeting. For one meeting she bought 4 pizzas and 10 sodas for \$63. The next meeting she bought 3 pizzas and 8 sodas for \$48. What is the cost of one pizza?

Let  $p$  = the cost of one pizza, and let  $s$  = the cost of one soda. Write a system of equations to represent the situation.

<u>Total cost</u> <u>of pizzas</u>	<u>plus</u>	<u>total cost</u> <u>of sodas</u>	<u>equals</u>	<u>total cost.</u>
$4p$	+	$10s$	=	63
$3p$	+	$8s$	=	48

Graph the equations  $4p + 10s = 63$  and  $3p + 8s = 48$ . The graphs appear to intersect at the point with coordinates (12, 1.5). Check this estimate by replacing  $p$  with 12 and  $s$  with 1.5 in each equation.



<b>CHECK:</b>	$4p + 10s = 63$	$3p + 8s = 48$
	?	?
	$4(12) + 10(1.5) = 63$	$3(12) + 8(1.5) = 48$
	?	?
	$48 + 15 = 63$	$36 + 12 = 48$
	$63 = 63 \checkmark$	$48 = 48 \checkmark$

One pizza will cost \$12.