LESSON MAKER PRO

Where Lines Meet

Find and interpret solutions to linear systems.

HIGH SCHOOL · MT.CORE.ALG.LIN.6

MT.CORE.ALG.LIN.6 "Solve systems of linear equations by graphing, substitution, and elimination, including systems with zero, one, or infinite solutions, while using technology and representations strategically."

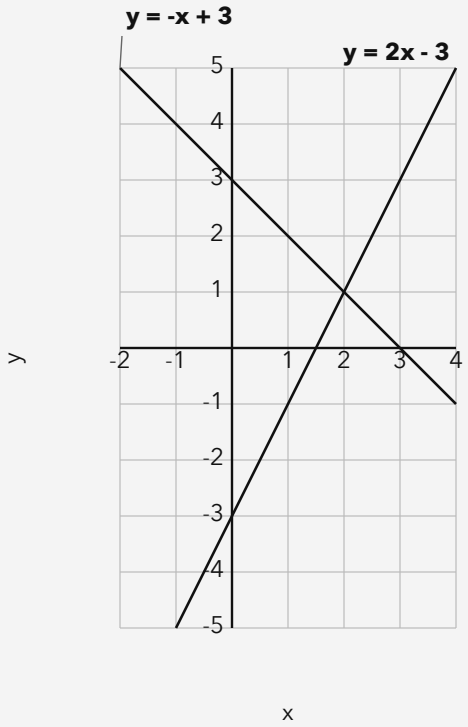
NAME _____ DATE _____

ONE SYSTEM, THREE OUTCOMES

A solution to a system is an (x, y) pair that makes both equations true. On a graph, lines that cross have one solution, parallel lines have no solution, and lines that lie on top of each other have infinitely many solutions. Use substitution or elimination when you need an exact answer or want to check what a graph shows.

WORKED EXAMPLE

What is the solution to the graphed system?

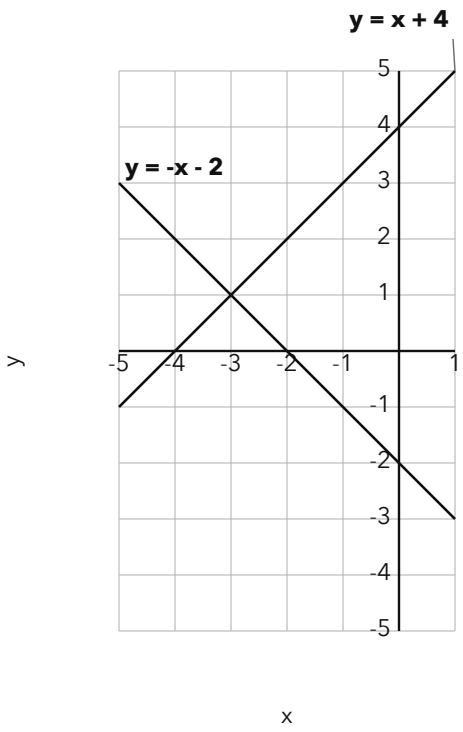


1. Find where the two lines cross on the graph.
2. Read the coordinates of that point: (2, 1).
3. Check: 2(2) - 3 = 1 and -(2) + 3 = 1.

Answer: (2, 1)

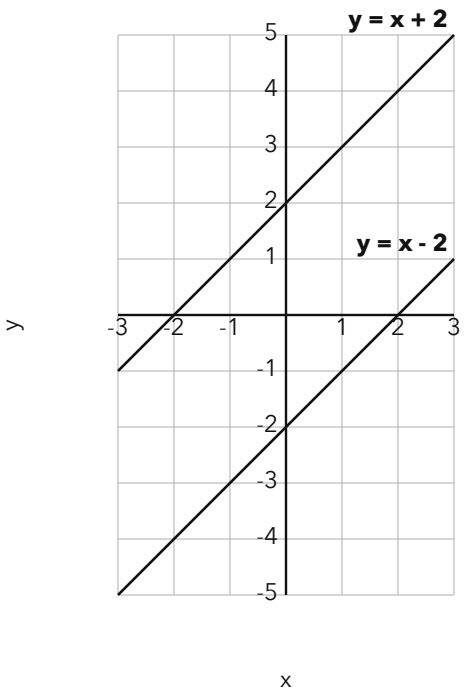
PRACTICE 6 problems

1 Read the point where the graphed lines cross. Give the solution as (x, y).



ANSWER _____

2 How many solutions does the graphed system have?



ANSWER _____

3 Solve by substitution: x = y + 4 and 2x + y = 11.

ANSWER _____

4 Solve by elimination: 3x + 2y = 16 and 3x - 2y = 8.

ANSWER _____

5 How many solutions does the system 4x - 2y = 6 and 2x - y = 5 have? Show why.

ANSWER _____

_____

6 How many solutions does the system 2x + 3y = 12 and 4x + 6y = 24 have? Show why.

ANSWER _____

_____

APPLY IT Show your work

1 You are choosing between two movie plans. Plan A costs $8 a month plus $2 per rental. Plan B costs $14 a month plus $1 per rental. At how many rentals do the plans cost the same, and what is that cost? Write and solve a system.

WORK SPACE

ANSWER _____

2 A student-run concert sold 40 tickets. Student tickets cost $7, and adult tickets cost $11. Ticket sales totaled $348. How many of each ticket were sold? Write and solve a system.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The first equation of a system is $2x + 3y = 12$. The second is $4x + ky = c$. Give one pair of values for (k, c) that makes the system have exactly one solution, one pair that makes it have no solution, and one pair that makes it have infinitely many solutions. Explain how you know.

WORK SPACE AND ANSWER

Where Lines Meet

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Read the point where the graphed lines cross. Give the solution as (x, y).	**(-3, 1)**
2	How many solutions does the graphed system have?	**0 solutions**
3	Solve by substitution: x = y + 4 and 2x + y = 11.	**(5, 1)**
4	Solve by elimination: 3x + 2y = 16 and 3x - 2y = 8.	**(4, 2)**
5	How many solutions does the system 4x - 2y = 6 and 2x - y = 5 have? Show why.	**0 solutions. Doubling 2x - y = 5 gives 4x - 2y = 10, which conflicts with 4x - 2y = 6.**
6	How many solutions does the system 2x + 3y = 12 and 4x + 6y = 24 have? Show why.	**Infinitely many solutions. The second equation is twice the first, so they describe the same line.**

PART 2 · APPLY IT

1. **6 rentals; $20** Let x be rentals and y be monthly cost: y = 8 + 2x and y = 14 + x. Set the costs equal: 8 + 2x = 14 + x, so x = 6 and y = 20.
2. **23 student tickets and 17 adult tickets** Let s be student tickets and a be adult tickets: s + a = 40 and 7s + 11a = 348. Substitute s = 40 - a to get 7(40 - a) + 11a = 348, so 4a = 68, a = 17, and s = 23.

CHALLENGE

One solution: (5, 24). No solution: (6, 25). Infinitely many solutions: (6, 24). Doubling the first equation gives 4x + 6y = 24. When k = 6, matching c gives the same line and a different c gives a parallel line. When k is not 6, the lines cross once.

Accept equivalent explanations for no or infinitely many solutions. For the challenge, accept any k other than 6 with any c for one solution; no solution requires k = 6 and c other than 24.