LESSON MAKER PRO

Where Lines Meet

Solve systems and explain what their graphs show.

GRADE 8 · 8A.AF.B.9

8A.AF.B.9 "Solve systems of two linear equations in two variables by graphing and substitution. a. Explain that the solution(s) of systems of two linear equations in two variables corresponds to points of intersection on their graphs because points..."

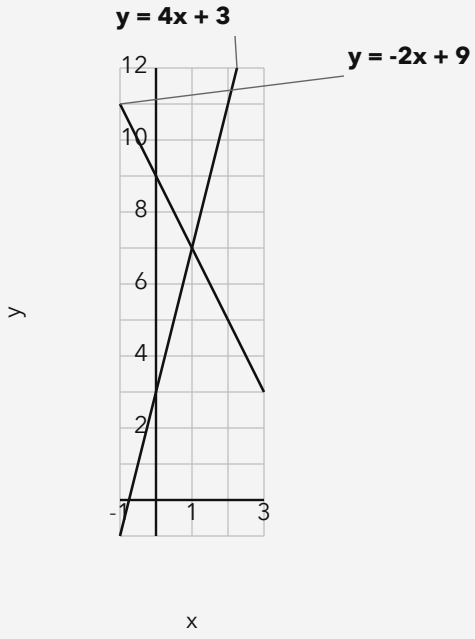
NAME _____ DATE _____

ONE POINT, TWO EQUATIONS

A solution to a system is a point (x, y) that makes both equations true. On a graph, a solution is where the lines meet. You can also solve by substitution: replace y in one equation with an expression equal to y from the other equation.

WORKED EXAMPLE

Use the graph to find where the lines meet. Then check the point in both equations.

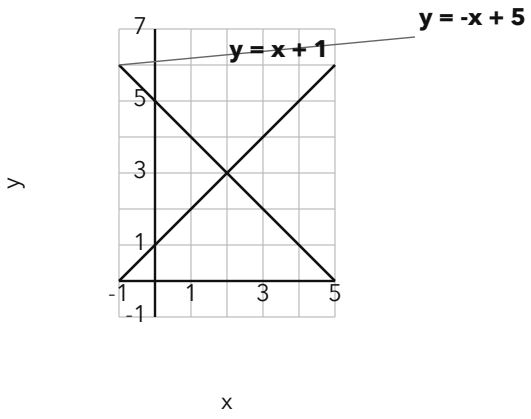


1. The lines meet where their y-values are equal: 4x + 3 = -2x + 9.
2. Add 2x and subtract 3: 6x = 6, so x = 1.
3. Substitute x = 1: y = 4(1) + 3 = 7.
4. Check the other equation: -2(1) + 9 = 7.

Answer: The lines meet at (1, 7), which satisfies both equations.

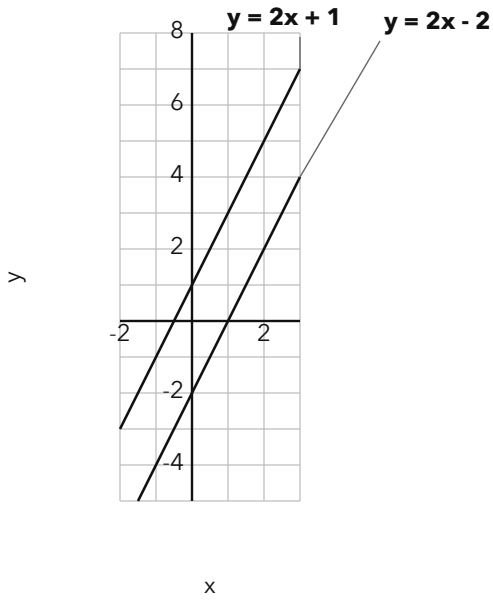
PRACTICE 6 problems

1 Where do the graphed lines meet? Show that the point satisfies both equations.



ANSWER _____

2 How many solutions does the graphed system have? Explain using the lines.



ANSWER _____

3 Solve by substitution: y = x + 5 and y = -2x - 1.

ANSWER _____

4 Solve by substitution: x + y = 7 and x - y = 1.

ANSWER _____

5 How many solutions does this system have? Explain: y = 3x - 4 and 2y = 6x - 8.

ANSWER _____

6 Solve by substitution: y = 2x + 5 and y = -x - 4.

ANSWER _____

APPLY IT Show your work

1 Two game-rental plans charge a monthly fee plus a fee for each game. Plan A costs $6 per month plus $2 per game. Plan B costs $12 per month plus $1 per game. How many games make the monthly costs equal, and what is that cost?

WORK SPACE

ANSWER _____

2 At two gaming lounges, the total cost includes an entry fee and an hourly fee. Lounge A charges $7 to enter plus $3 per hour. Lounge B charges $10 to enter plus $3 per hour. Will the total costs ever be equal? Explain.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Find the value of k that makes $y = 2x + k$ and $4x - 2y = 6$ have infinitely many solutions. Explain why.

WORK SPACE AND ANSWER

ANSWER KEY

Where Lines Meet

GRADE 8 · 8A.AF.B.9

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Where do the graphed lines meet? Show that the point satisfies both equations.	**(2, 3); 3 = 2 + 1 and 3 = -2 + 5.**
2	How many solutions does the graphed system have? Explain using the lines.	**No solution. The lines are parallel and never meet.**
3	Solve by substitution: y = x + 5 and y = -2x - 1.	**(-2, 3)**
4	Solve by substitution: x + y = 7 and x - y = 1.	**(4, 3)**
5	How many solutions does this system have? Explain: y = 3x - 4 and 2y = 6x - 8.	**Infinitely many solutions. Dividing the second equation by 2 gives y = 3x - 4, so both equations describe the same line.**
6	Solve by substitution: y = 2x + 5 and y = -x - 4.	**(-3, -1)**

PART 2 · APPLY IT

1. **6 games; $18 for either plan.** Let x be the number of games and y the monthly cost. Set 6 + 2x = 12 + x to get x = 6, then substitute to get y = 18.
2. **No. Lounge B always costs $3 more, so the costs are never equal.** The equations are y = 7 + 3x and y = 10 + 3x. They have the same hourly rate but different entry fees, so their graphs are parallel.

CHALLENGE

k = -3. Rearranging 4x - 2y = 6 gives y = 2x - 3. When k = -3, the equations describe the same line, so every point on it is a solution.

Accept an ordered pair written as x and y values. For explanations, accept equivalent reasoning that correctly connects solutions to where the lines meet.