LESSON MAKER PRO

Where Lines Meet

Find and explain solutions to systems of equations.

GRADE 8 · 8.AF.C.12

8.AF.C.12 "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..."

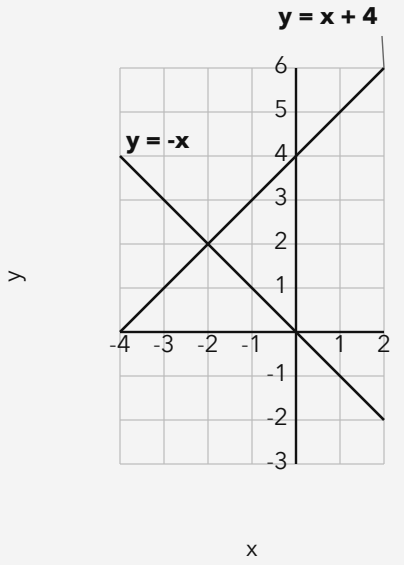
NAME _____ DATE _____

THE BIG IDEA

A solution to a system is an ordered pair that makes both equations true. On a graph, a solution is a point where the lines cross. Lines that never cross have no solution, while lines that lie on top of each other have infinitely many solutions.

WORKED EXAMPLE

Use the graph to solve the system y = x + 4 and y = -x. Check your answer in both equations.

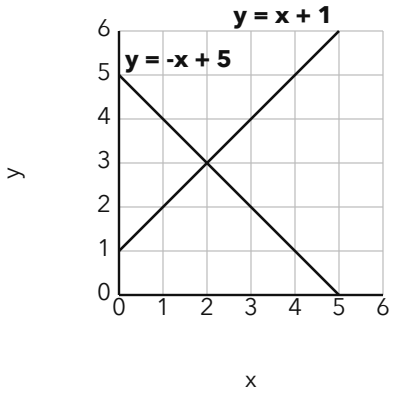


1. Find where the two lines cross: (-2, 2).
2. Check y = x + 4: 2 = -2 + 4.
3. Check y = -x: 2 = -(-2).

Answer: (-2, 2)

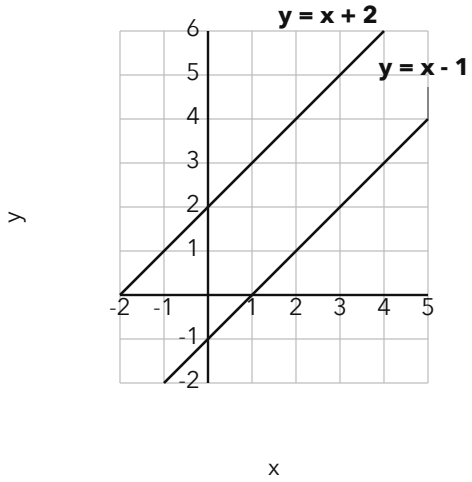
PRACTICE 6 problems

1 Use the graph to find the solution. Show that your ordered pair satisfies both equations.



ANSWER _____

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



ANSWER _____

3 Solve by substitution: x + y = 7 and y = 2x + 1.

ANSWER _____

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

ANSWER _____

5 Solve by substitution: 2x + y = 10 and x - y = 2.

ANSWER _____

6 How many solutions does the system y = 3x - 2 and 2y = 6x - 4 have? Explain.

ANSWER _____

APPLY IT Show your work

1 Two gaming clubs charge for visits. Club A charges a $9 sign-up fee plus $5 per visit. Club B charges a $21 sign-up fee plus $3 per visit. After how many visits will the total costs be the same, and what will each club cost?

WORK SPACE

ANSWER _____

2 Tickets to a school esports match cost $5 for students and $8 for adults. The school sold 19 tickets and collected $119. How many student tickets and adult tickets were sold?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Consider the system y = 2x + 3 and 3y = 6x + k. What value of k gives infinitely many solutions? What happens for every other value of k? Explain why the system can never have exactly one solution.

WORK SPACE AND ANSWER

ANSWER KEY

Where Lines Meet

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the graph to find the solution. Show that your ordered pair 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, so they never cross.**
3	Solve by substitution: x + y = 7 and y = 2x + 1.	**(2, 5)**
4	Solve by substitution: y = 3x - 4 and y = -x + 4.	**(2, 2)**
5	Solve by substitution: 2x + y = 10 and x - y = 2.	**(4, 2)**
6	How many solutions does the system y = 3x - 2 and 2y = 6x - 4 have? Explain.	**Infinitely many solutions. Dividing the second equation by 2 gives the first equation, so both equations graph as the same line.**

PART 2 · APPLY IT

1. **After 6 visits, each club costs $39.** Let v be the number of visits. Solve 9 + 5v = 21 + 3v to get v = 6, then substitute to get $39.
2. **11 student tickets and 8 adult tickets.** Let s and a be the numbers of student and adult tickets. Substitute s = 19 - a into 5s + 8a = 119 to get a = 8 and s = 11.

CHALLENGE

k = 9 gives infinitely many solutions. Dividing the second equation by 3 gives y = 2x + k/3. If k is not 9, the lines have the same slope but different y-intercepts, so they never cross. They can never cross at exactly one point.

Accept equivalent substitution work and explanations. In Problem 1, the checks must show that the ordered pair satisfies both equations.