LESSON MAKER PRO

Where Lines Meet

Connect a graph's crossing point to a system's solution.

GRADE 8 · 8.AF.C.12.a

8.AF.C.12.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 of intersection satisfy both equations simultaneously."

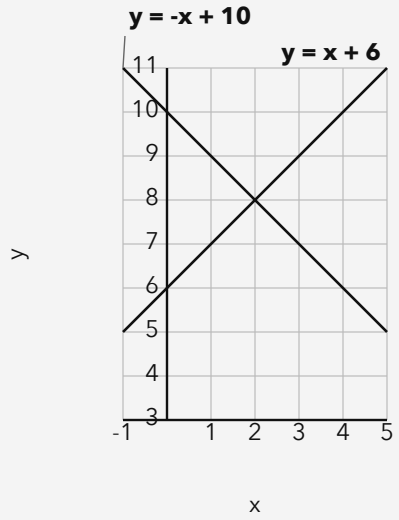
NAME _____ DATE _____

THE BIG IDEA

A solution to a system is an ordered pair that makes both equations true. On a graph, that pair is where the two lines intersect. You can check an intersection by putting its x- and y-values into each equation.

WORKED EXAMPLE

Use the graph to find where the lines intersect. Show why that point solves both equations.

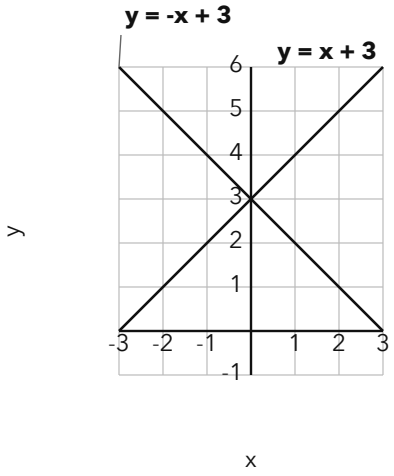


1. Read the intersection from the graph: (2, 8).
2. Check the first line: 8 = 2 + 6.
3. Check the second line: 8 = -2 + 10.

Answer: (2, 8) solves the system because it makes both equations true.

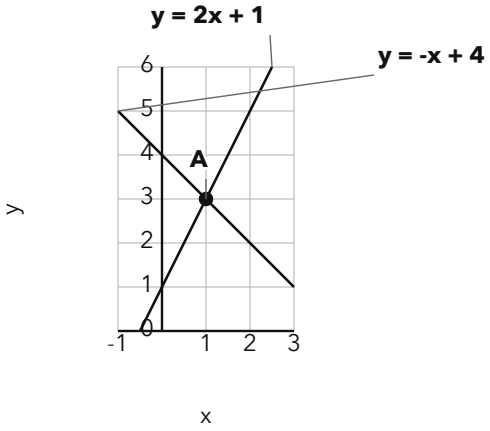
PRACTICE 6 problems

1 Find the intersection on the graph. Substitute its coordinates into both line equations to show why it is a solution.



ANSWER _____

2 Does point A solve the system shown on the graph? Check it in both equations.



ANSWER _____

3 Is (3, 4) an intersection of y = x + 1 and y = 2x - 2? Show how you know.

ANSWER _____

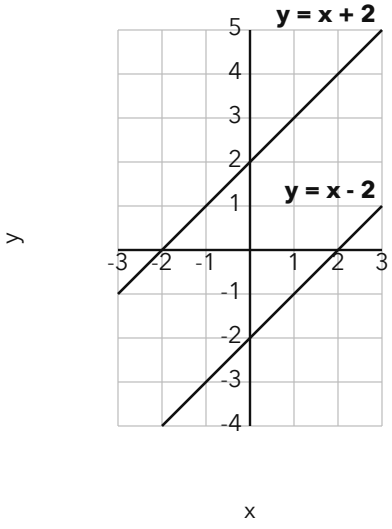
4 Is (2, 4) an intersection of y = 2x and y = x + 3? Show how you know.

ANSWER _____

5 Find the intersection of y = 3x - 2 and y = -x + 2. Show why your point is on both lines.

ANSWER _____

6 How many solutions does the system on the graph have? Explain using the lines.



ANSWER _____

APPLY IT Show your work

1 A game service offers two plans. Plan A charges a $3 setup fee and $4 per month. Plan B charges a $9 setup fee and $2 per month. After how many months will the total costs be equal, and what will each plan cost? Explain what the intersection means.

WORK SPACE

ANSWER _____

2 Two school esports teams track their followers. Team A starts with 12 followers and gains 3 each week. Team B starts with 4 followers and gains 5 each week. After how many weeks will they have the same number of followers? How many will each have? Explain what the intersection means.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The system is y = 2x + 2 and 2y = 4x + 4. How many solutions does it have? Give two different solution points and explain what the two graphs would show.

WORK SPACE AND ANSWER

ANSWER KEY

Where Lines Meet

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the intersection on the graph. Substitute its coordinates into both line equations to show why it is a solution.	**(0, 3); 3 = 0 + 3 and 3 = -0 + 3.**
2	Does point A solve the system shown on the graph? Check it in both equations.	**Yes. A is (1, 3), and 3 = 2(1) + 1 and 3 = -1 + 4.**
3	Is (3, 4) an intersection of y = x + 1 and y = 2x - 2? Show how you know.	**Yes. 4 = 3 + 1 and 4 = 2(3) - 2, so the point is on both lines.**
4	Is (2, 4) an intersection of y = 2x and y = x + 3? Show how you know.	**No. 4 = 2(2), but 4 is not equal to 2 + 3, so the point is on only one line.**
5	Find the intersection of y = 3x - 2 and y = -x + 2. Show why your point is on both lines.	**(1, 1). Setting the expressions equal gives 3x - 2 = -x + 2, so x = 1; both equations then give y = 1.**
6	How many solutions does the system on the graph have? Explain using the lines.	**No solutions. The lines are parallel, so they never intersect.**

PART 2 · APPLY IT

1. **After 3 months, each plan costs $15. The intersection (3, 15) means both plans have a total cost of $15 at 3 months.** Let x be months and y be total cost. Set 4x + 3 = 2x + 9 to get x = 3, then substitute to get y = 15.
2. **After 4 weeks, each team has 24 followers. The intersection (4, 24) means both teams have 24 followers at 4 weeks.** Let x be weeks and y be followers. Set 12 + 3x = 4 + 5x to get x = 4, then substitute to get y = 24.

CHALLENGE

Infinitely many solutions. For example, (0, 2) and (1, 4) satisfy both equations. Dividing the second equation by 2 gives y = 2x + 2, so the graphs are the same line and share every point.

Accept equivalent substitutions and explanations that connect a solution to a point on both lines. For the challenge, accept any two distinct points that satisfy both equations.