LESSON MAKER PRO

Systems in Action

Write, solve, and interpret systems with two or three variables.

HIGH SCHOOL · MA.912.AR.9

MA.912.AR.9 "Write and solve a system of two- and three-variable equations and inequalities that describe quantities or relationships."

NAME _____ DATE _____

SOLVE EVERY CONDITION

To solve an equation system, use substitution or elimination to make one variable alone, then substitute back to find the other values. For an inequality system, keep only the values that make every inequality true. Reverse an inequality sign only when you multiply or divide by a negative number.

WORKED EXAMPLE

Solve the system: $5x + y = 132$ $6x - y = 121$

1. Add the equations: $11x = 253$.
2. Divide by 11: $x = 23$.
3. Substitute into $5x + y = 132$: $5(23) + y = 132$, so $y = 17$.

Answer: (x, y) = (23, 17)

PRACTICE 6 problems

1 Solve the system: x + y = 14 x - y = 2

ANSWER _____

2 Solve the system: x + y + z = 24 x - y = 1 y + z = 16

ANSWER _____

3 Rewrite the system with y isolated. This describes all points that solve both inequalities: x + y <= 14 x - y >= 2

ANSWER _____

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4 Solve the system: 2x + y = 25 x + y = 16

ANSWER _____

5 Solve the system: x + y + z = 24 x - y = 2 y + z = 15

ANSWER _____

6 Write and solve a system for two numbers. The first number is 2 greater than the second number, and their sum is 18.

ANSWER _____

_____

APPLY IT Show your work

1 Student council sells tickets for a school concert. Student tickets cost $8, and community tickets cost $12. The council sells 24 tickets and collects $224. Write and solve a system to find how many of each type of ticket were sold.

WORK SPACE

ANSWER _____

2 An esports club orders drinks for a tournament. Water costs $1, juice costs $2, and smoothies cost $7. The club orders 20 drinks for $81, and it orders exactly 2 more smoothies than juices. Write and solve a system to find each type of drink ordered.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Solve the system. Then explain how you know your values satisfy all three equations: x + y + z = 24 2x + y - z = 18 x - y + 2z = 13

WORK SPACE AND ANSWER

Systems in Action

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve the system: x + y = 14 x - y = 2	**(x, y) = (8, 6)**
2	Solve the system: x + y + z = 24 x - y = 1 y + z = 16	**x = 8, y = 7, z = 9**
3	Rewrite the system with y isolated. This describes all points that solve both inequalities: x + y <= 14 x - y >= 2	**y <= 14 - x and y <= x - 2**
4	Solve the system: 2x + y = 25 x + y = 16	**(x, y) = (9, 7)**
5	Solve the system: x + y + z = 24 x - y = 2 y + z = 15	**x = 9, y = 7, z = 8**
6	Write and solve a system for two numbers. The first number is 2 greater than the second number, and their sum is 18.	**x + y = 18; x - y = 2; x = 10, y = 8**

PART 2 · APPLY IT

1. **s + c = 24; 8s + 12c = 224; s = 16 student tickets and c = 8 community tickets.** Let s be student tickets and c be community tickets. Substitute s = 24 - c into the money equation to get c = 8, then find s = 16.
2. **w + j + m = 20; w + 2j + 7m = 81; m = j + 2; w = 4, j = 7, m = 9.** Use m = j + 2 and w = 20 - j - m in the cost equation. This gives j = 7, then m = 9 and w = 4.

CHALLENGE

(x, y, z) = (8, 9, 7). Substitution gives 24, 18, and 13 in the three equations, so the values satisfy all of them.

Accept equivalent variable names and equivalent equation systems for the written-system items. For problem 3, accept any equivalent pair of inequalities that describes the same overlapping solution region.