LESSON MAKER PRO

Matrix System Match

Write linear systems as one matrix equation.

HIGH SCHOOL · HSA-REI.C.8

CCSS.Math.Content.HSA-REI.C.8 "(+) Represent a system of linear equations as a single matrix equation in a vector variable."

NAME _____ DATE _____

PACK A SYSTEM INTO A MATRIX

Put the coefficients of each equation into one row of a coefficient matrix. Keep the variable order the same in every row, then multiply by a column vector of variables and set it equal to a column vector of constants.

WORKED EXAMPLE

Represent this system as one matrix equation: 7x - 3y = 11 and 4x + 6y = -2.

1. Put the x- and y-coefficients in rows: [[7, -3], [4, 6]].
2. Use the variable vector [[x], [y]].
3. Put the constants in a column vector: [[11], [-2]].
4. Combine the three parts into one equation.

Answer: [[7, -3], [4, 6]] [[x], [y]] = [[11], [-2]]

PRACTICE 6 problems

1 Represent this system as one matrix equation: 5x + 2y = 13 and -9x + 8y = 14.

ANSWER _____

2 Represent this system as one matrix equation: -13x + 17y = 21 and 22x = -18.

ANSWER _____

3 Represent this system as one matrix equation: 24x - 25y = 26 and 27x + 28y = 29.

ANSWER _____

4 Represent this system as one matrix equation: (1/5)x - (8/9)y = 10/13 and (14/15)x + (16/17)y = -18/19.

ANSWER _____

5 Write the system of equations represented by [[30, -31], [32, 33]] [[x], [y]] = [[34], [35]].

ANSWER _____

6 Represent this three-equation system as one matrix equation: 36x + 37y = 38, -39x + 40y = 41, and 42x = 43.

ANSWER _____

APPLY IT Show your work

1 A student art club sells x stickers and y keychains at a game night. They sell 47 items total. Stickers cost $8 each, keychains cost $10 each, and total sales are $406. Let x be the number of stickers and y be the number of keychains. Represent the situation as one matrix equation.

WORK SPACE

ANSWER _____

2 A robotics team packs x standard kits and y advanced kits for a competition. The team packs 53 kits total. Each standard kit uses 13 screws, each advanced kit uses 24 screws, and the team uses 931 screws. Let x be the number of standard kits and y be the number of advanced kits. Represent the situation as one matrix equation.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Represent this system as a matrix equation using the vector variable [[y], [x]], in that order: 46x - 47y = 48 and 49x + 50y = -51.

WORK SPACE AND ANSWER

ANSWER KEY

Matrix System Match

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Represent this system as one matrix equation: 5x + 2y = 13 and -9x + 8y = 14.	**[[5, 2], [-9, 8]] [[x], [y]] = [[13], [14]]**
2	Represent this system as one matrix equation: -13x + 17y = 21 and 22x = -18.	**[[-13, 17], [22, 0]] [[x], [y]] = [[21], [-18]]**
3	Represent this system as one matrix equation: 24x - 25y = 26 and 27x + 28y = 29.	**[[24, -25], [27, 28]] [[x], [y]] = [[26], [29]]**
4	Represent this system as one matrix equation: (1/5)x - (8/9)y = 10/13 and (14/15)x + (16/17)y = -18/19.	**[[1/5, -8/9], [14/15, 16/17]] [[x], [y]] = [[10/13], [-18/19]]**
5	Write the system of equations represented by [[30, -31], [32, 33]] [[x], [y]] = [[34], [35]].	**30x - 31y = 34; 32x + 33y = 35**
6	Represent this three-equation system as one matrix equation: 36x + 37y = 38, -39x + 40y = 41, and 42x = 43.	**[[36, 37], [-39, 40], [42, 0]] [[x], [y]] = [[38], [41], [43]]**

PART 2 · APPLY IT

1. **[[1, 1], [8, 10]] [[x], [y]] = [[47], [406]]** Use x + y = 47 for the item total and 8x + 10y = 406 for the sales total. Put the coefficients, variables, and constants into matching rows.
2. **[[1, 1], [13, 24]] [[x], [y]] = [[53], [931]]** Use x + y = 53 for the kit total and 13x + 24y = 931 for the screw total. The coefficient columns follow the order x, then y.

CHALLENGE

[[-47, 46], [50, 49]] [[y], [x]] = [[48], [-51]]

Accept equivalent matrix equations if the equation rows are reordered consistently. Require each coefficient column to match the stated variable-vector order, and require 0 for a missing variable coefficient.