LESSON MAKER PRO

Matrix Multiplier Lab

Scale every entry, keep the same matrix shape.

HIGH SCHOOL · HSN-VM.C.7

CCSS.Math.Content.HSN-VM.C.7 "(+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled."

NAME _____ DATE _____

THE SCALING RULE

To multiply a matrix by a scalar, multiply every entry in the matrix by that scalar. The number of rows and columns stays the same. A negative scalar changes the sign of each entry.

WORKED EXAMPLE

Multiply -4 by [1 -2; 3 0].

1. Multiply 1 by -4 to get -4, and multiply -2 by -4 to get 8.
2. Multiply 3 by -4 to get -12, and multiply 0 by -4 to get 0.
3. Place the products in the same positions as the original entries.

Answer: [-4 8; -12 0]

PRACTICE 6 problems

1 Multiply 5 by [6 -7; 8 9].

ANSWER _____

2 Multiply -6 by [7 5 -8].

ANSWER _____

3 Multiply 7 by [9; -6].

ANSWER _____

4 Multiply 6/7 by [7 -5; 8 9].

ANSWER _____

5 Multiply -8 by [5; -7; 6].

ANSWER _____

6 Multiply 9 by [-6 8; 7 -5].

ANSWER _____

APPLY IT Show your work

1 A music club earns royalty amounts, in dollars, shown by the matrix [7 8; 9 6; 5 7]. A sponsor adds 5 dollars for every dollar the club earns, so each original amount becomes 6 times as large. What matrix shows the new royalty amounts?

WORK SPACE

ANSWER _____

2 In a game design club, a payoff matrix for two strategies is [8 -5; 7 6]. The club decides to double every payoff for a final round. What is the new payoff matrix?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Jordan claims that -5[x 7; -6 y] = [35 -35; 30 -45]. Find x and y. Explain how you used corresponding entries to check your answer.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Multiply 5 by [6 -7; 8 9].	**[30 -35; 40 45]**
2	Multiply -6 by [7 5 -8].	**[-42 -30 48]**
3	Multiply 7 by [9; -6].	**[63; -42]**
4	Multiply 6/7 by [7 -5; 8 9].	**[6 -30/7; 48/7 54/7]**
5	Multiply -8 by [5; -7; 6].	**[-40; 56; -48]**
6	Multiply 9 by [-6 8; 7 -5].	**[-54 72; 63 -45]**

PART 2 · APPLY IT

1. **[42 48; 54 36; 30 42]** Multiply every entry in the royalty matrix by 6. Keep the three rows and two columns in the same order.
2. **[16 -10; 14 12]** Multiply each payoff, including the negative payoff, by 2. The matrix shape does not change.

CHALLENGE

x = -7 and y = 9. Since -5(-7) = 35 and -5(9) = -45, the corresponding entries match.

Accept equivalent matrix notation, as long as entries remain in the correct rows and columns. For fractional entries, accept equivalent fractions such as -30/7 or -4 2/7.