LESSON MAKER PRO

Scalar Vector Moves

Scale each component, then track direction.

HIGH SCHOOL · MA.912.NSO.3.6

MA.912.NSO.3.6 "Multiply a vector by a scalar algebraically or graphically."

NAME _____ DATE _____

SCALE EVERY COMPONENT

To multiply a vector by a scalar, multiply each component by the same scalar. A positive scalar keeps the vector's direction, a negative scalar reverses its direction, and zero creates the zero vector. The magnitude is multiplied by the scalar's absolute value, so a scalar with absolute value one preserves magnitude.

WORKED EXAMPLE

Multiply 3(11, -9).

1. Multiply the first component: 3 * 11 = 33.
2. Multiply the second component: 3 * -9 = -27.
3. Write the scaled vector as (33, -27).

Answer: (33, -27)

PRACTICE 6 problems

1 Multiply 5(2, -6).

ANSWER _____

2 Multiply -4(-7, 1).

ANSWER _____

3 Multiply 1/2(8, -12).

ANSWER _____

4 A vector moves 6 units right and 5 units down. Multiply it by -2. State the new horizontal and vertical movement.

ANSWER _____

_____

5 Multiply 0(-8, 14).

ANSWER _____

6 Multiply -1(15, -2).

ANSWER _____

APPLY IT Show your work

1 In a racing game, a car's position-change vector for one boost is (4, -7) grid units. A replay effect multiplies the vector by -6. What is the new position-change vector?

WORK SPACE

ANSWER _____

2 For a video project, a camera slider moves (5, -2) feet during one planned shot. The director repeats that movement 8 times in the same direction. What is the total displacement vector?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let v = (12, -4). Find the scalar k such that kv = (-84, 28). Explain how both components confirm your value of k.

WORK SPACE AND ANSWER

ANSWER KEY # Scalar Vector Moves

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Multiply 5(2, -6).	**(10, -30)**
2	Multiply -4(-7, 1).	**(28, -4)**
3	Multiply 1/2(8, -12).	**(4, -6)**
4	A vector moves 6 units right and 5 units down. Multiply it by -2. State the new horizontal and vertical movement.	**12 units left and 10 units up**
5	Multiply 0(-8, 14).	**(0, 0)**
6	Multiply -1(15, -2).	**(-15, 2)**

PART 2 · APPLY IT

1. **(-24, 42)** Multiply both components by -6. The negative scalar reverses the direction of the original vector.
2. **(40, -16)** Multiply each component of the movement vector by 8 to find the total displacement.

CHALLENGE

k = -7. Since -7(12) = -84 and -7(-4) = 28, both components match.

Accept equivalent vector notation, including angle brackets instead of parentheses. For the directional problem, accept the component form (-12, 10) as equivalent to 12 units left and 10 units up.