



Scalar Multiples and Vector Directions

Today's Standard

HSN.VM.B5b - Compute the magnitude of a scalar multiple $c\mathbf{v}$ using $\|c\mathbf{v}\| = |c|\mathbf{v}$. Compute the direction of $c\mathbf{v}$ knowing that when $|c|\mathbf{v} \neq 0$, the direction of $c\mathbf{v}$ is either along \mathbf{v} (for $c > 0$) or against \mathbf{v} (for $c < 0$).

Cues	Notes
What is scalar multiplication?	Scalar multiplication involves multiplying a vector by a scalar, which scales the vector's magnitude.
How do you compute the magnitude of $c\mathbf{v}$?	To compute the magnitude of $c\mathbf{v}$, use $\ c\mathbf{v}\ = c \mathbf{v}$, where $ c $ is the absolute value of the scalar.
What happens to the direction of $c\mathbf{v}$ when c is negative?	When c is negative, the direction of $c\mathbf{v}$ is opposite to the direction of \mathbf{v} .
Why is the absolute value of c important?	The absolute value of c ensures that the magnitude is always a positive quantity, reflecting the true length of the vector.
How does this standard apply to real-world scenarios?	This standard is applicable in physics (force vectors), engineering (stress analysis), and computer graphics (object transformations).

Summary

Understanding scalar multiplication of vectors involves computing the magnitude using the absolute value of the scalar and determining the direction based on the sign of the scalar. This knowledge is essential for applications in various scientific and engineering fields.