

scalar multiplication

Geometric Interpretation

Scaling:

Direction:

scalar multiplication

- An operation where a vector is multiplied by a scalar resulting in a new vector
- The new vector's direction remains the same (or reversed if the scalar is negative), and its magnitude is scaled by the absolute value of the scalar
- **Geometric Interpretation** (let k be a scalar)
 - **Scaling:** scalar multiplication changes the length (magnitude) of the vector
 - if $k > 1$, the vector is stretched
 - if $0 < k < 1$, the vector is compressed.
 - if $k = -1$, the vector reverses direction but retains its magnitude.
 - The length of a scalar multiple of a vector is the absolute value of the scalar times the length of the vector, i.e. $\|k\vec{a}\| = |k| \cdot \|\vec{a}\|$
 - **Direction:**
 - if $k > 0$, the direction of the vector remains unchanged.
 - if $k < 0$, the direction of the vector is reversed

scalar multiplication

example

What is the scalar value here multiplied to $\vec{a} = [2, 1]$?

