Product of a real number by a vector

The product of a real number λ per a vector u→ is another vector λu→ that has:

1. The same angle as u→.
2. Its magnitude is equal to that of u→ times the absolute value of λ.|λu→|=|λ|·|u→|
3. It has the same direction as u→ if λ>0 and the opposite one if λ<0. From this we can deduce that if λ=0 or if u→=0→, then λu→=0→.

To obtain the components of the vector λu→ it is enough to multiply by λ the components

$$\lambda\vec{u} = \lambda \cdot (x_1, y_1) = (\lambda \cdot x_1, \lambda \cdot y_1)$$

If $\vec{u} = (-1, 3)$ and $\lambda = 3$, then:

$$\lambda\vec{u} = 3 \cdot (-1, 3) = (-3, 9)$$

Properties of the product of real numbers and a vector:

1. $\lambda(\vec{u} + \vec{v}) = \lambda\vec{u} + \lambda\vec{v}$
2. $(\lambda + \mu)\vec{u} = \lambda\vec{u} + \mu\vec{u}$
3. $\lambda(\mu\vec{u}) = (\lambda\mu)\vec{u}$
4. $1 \cdot \vec{u} = \vec{u}$