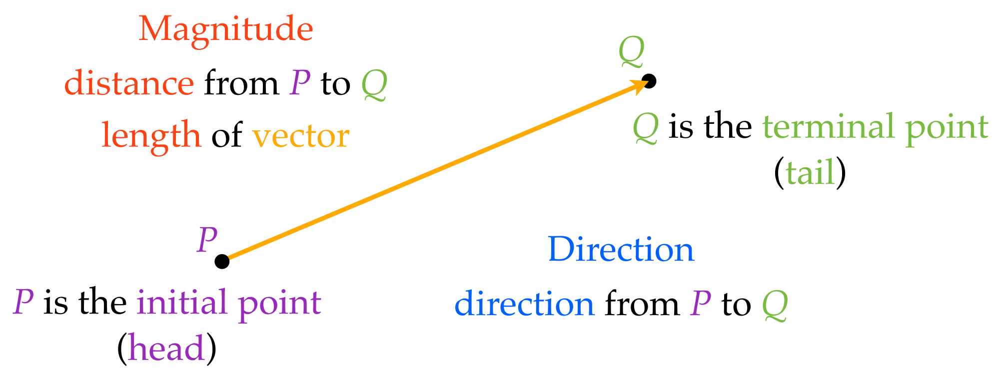
# Scalar Multiplication with Vectors

Name ____________________

Date ____________ Period ______

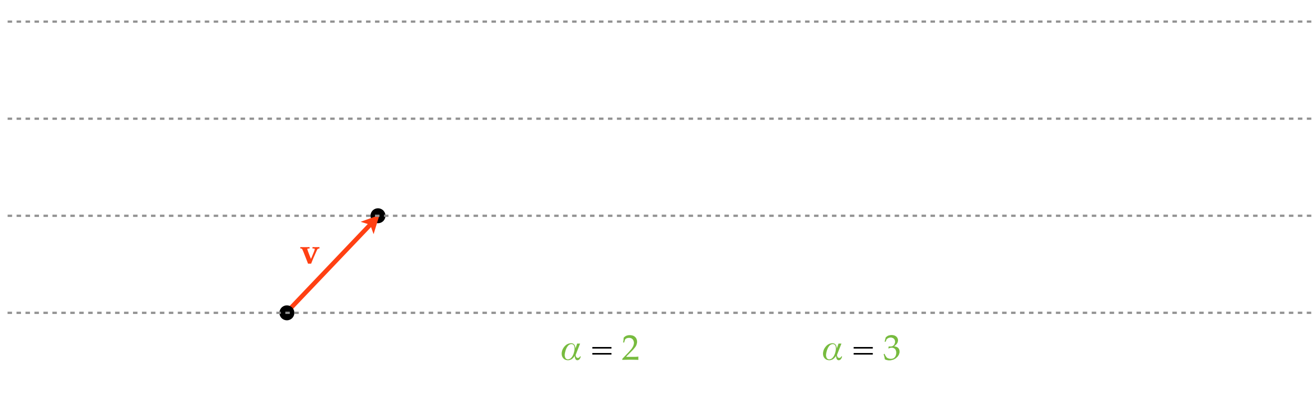
Vectors have a starting and ending point

A vector is a quantity with magnitude and direction



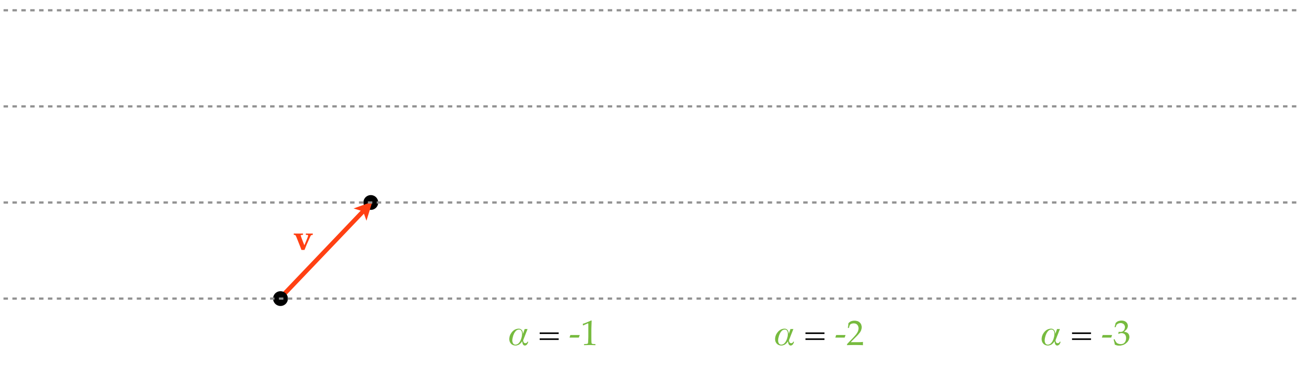

Given scalar $\alpha$ and $\mathbf{v}$,

1. if $\alpha > 0$, then $\alpha\mathbf{v}$ has a magnitude $\alpha$ times that of $\mathbf{v}$ in the same direction as $\mathbf{v}$.



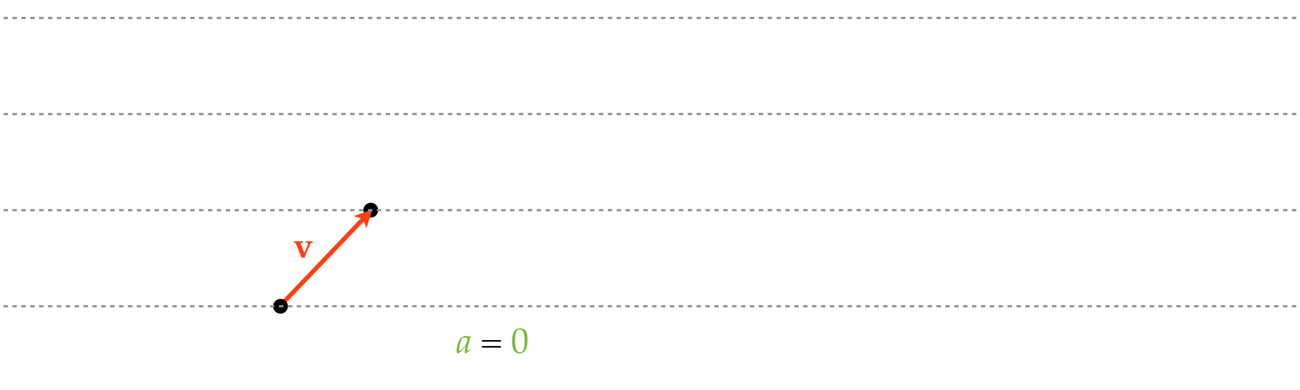
Given scalar $\alpha$ and $\mathbf{v}$,

1. if $\alpha > 0$, then $\alpha\mathbf{v}$ has a magnitude $\alpha$ times that of $\mathbf{v}$ in the same direction as $\mathbf{v}$.
2. if $\alpha < 0$, then $\alpha\mathbf{v}$ has a magnitude $|\alpha|$ times that of $\mathbf{v}$ in the opposite direction as $\mathbf{v}$.




Given scalar $\alpha$ and $\mathbf{v}$,

1. if $\alpha > 0$, then $\alpha\mathbf{v}$ has a magnitude $\alpha$ times that of $\mathbf{v}$ in the same direction as $\mathbf{v}$.
2. if $\alpha < 0$, then $\alpha\mathbf{v}$ has a magnitude $|\alpha|$ times that of $\mathbf{v}$ in the opposite direction as $\mathbf{v}$.
3. if $\alpha = 0$ or if $\mathbf{v} = \mathbf{0}$, the $\alpha\mathbf{v} = \mathbf{0}$.



Given scalar $\alpha$ and $\beta$, $\mathbf{v}$ and $\mathbf{w}$, scalar multiplication has the following properties.

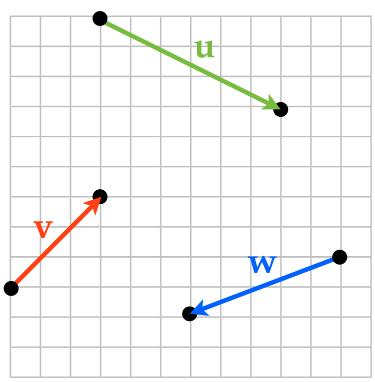
$0\mathbf{v} = \mathbf{0}$ $\quad$ $1\mathbf{v} = \mathbf{v}$ $\quad$ $-1\mathbf{v} = -\mathbf{v}$

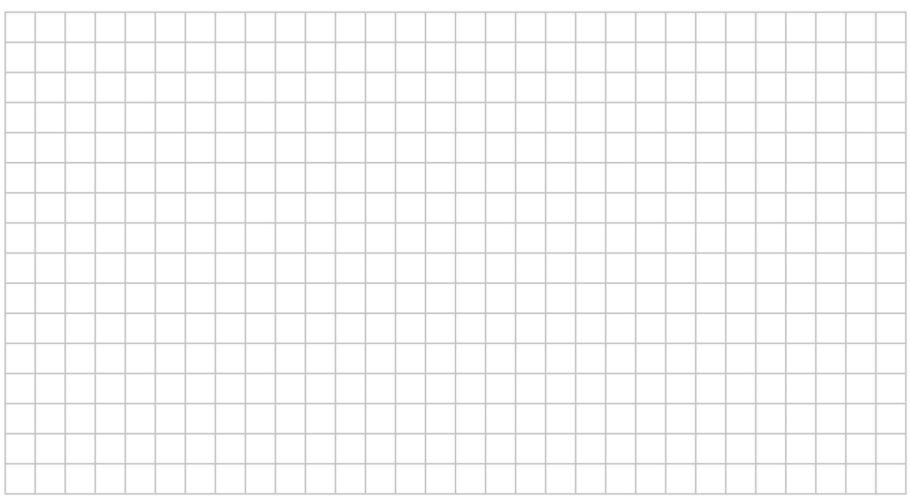
$(\alpha + \beta)\mathbf{v} = \alpha\mathbf{v} + \beta\mathbf{v}$ $\quad$ $\alpha(\mathbf{v} + \mathbf{w}) = \alpha\mathbf{v} + \alpha\mathbf{w}$

$\alpha(\beta\mathbf{v}) = (\alpha\beta)\mathbf{v}$

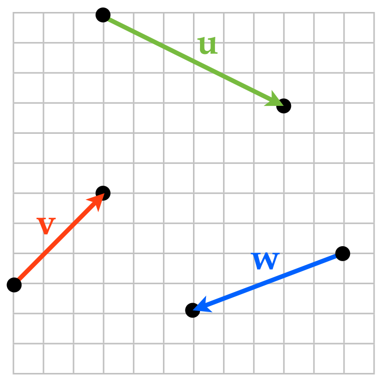
Given $\mathbf{u}$, $\mathbf{v}$ and $\mathbf{w}$, complete the following.

$2\mathbf{v} + 3\mathbf{w}$



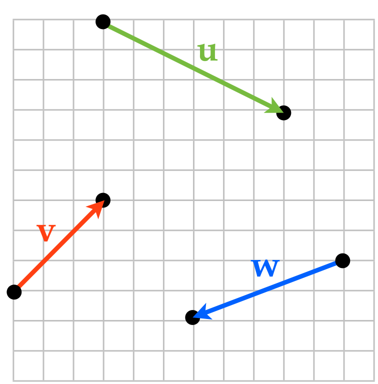



Given **u**, **v** and **w**, complete the following.



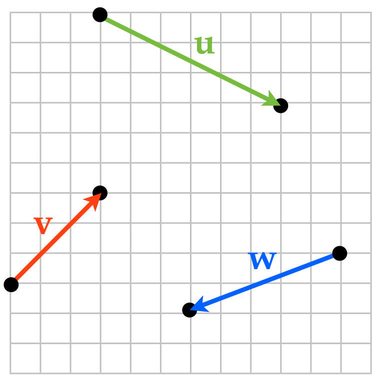

3**u** + 2**v**

Given **u**, **v** and **w**, complete the following.




**u** – 3**w**

Given **u**, **v** and **w**, complete the following.




-**v** – 2**u**