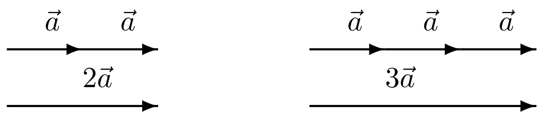
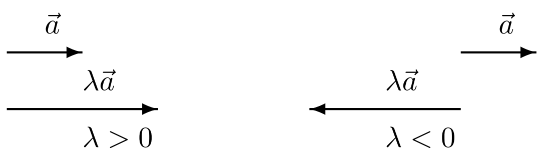
2.Multiplication by scalars

Denoting the sums $\vec{a}+\vec{a}$, $\vec{a}+\vec{a}+\vec{a}$, ... by $2\vec{a}$, $3\vec{a}$, ... and defining $1\vec{a}$, $0\vec{a}$ as $\vec{a}$ and 0, the vector $n\vec{a}$ ($n \in \mathbb{N}$) will denote a vector having the same direction and sense as $\vec{a}$ and length n times that for $\vec{a}$:



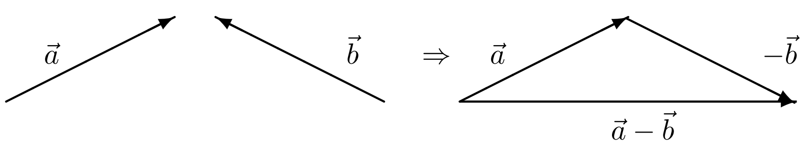
For any $\lambda \in \mathbb{R}$, we define $\lambda\vec{a}$ as a vector of length $|\lambda||\vec{a}|$ parallel[1] to $\vec{a}$ and agreeing or disagreeing in sense with $\vec{a}$ according as $\lambda > 0$ or $\lambda < 0$:



In particular for $\lambda = -1$, we have the vector $(-1)\vec{a} = -\vec{a}$ which is opposite to $\vec{a}$, called the additive inverse of $\vec{a}$, since $\vec{a} + (-\vec{a}) = 0$.

$\lambda\vec{a}$ and $\vec{a}$ have parallel supports, and are called collinear vectors.

The difference $\vec{a} - \vec{b}$ is by definition the sum $\vec{a} + (-\vec{b})$:



[1]Two coplanar lines (lying on the same plane) having no common point are called parallel. But in this book parallelism of lines is defined to include also the coincidence of lines.