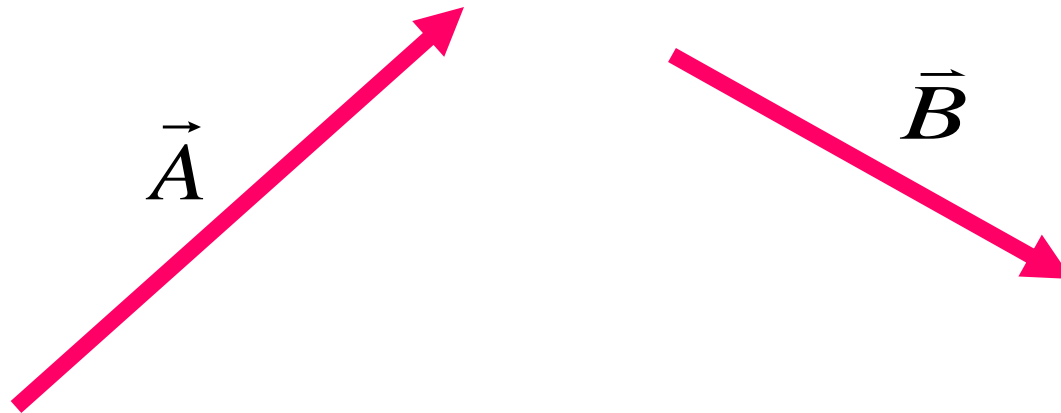
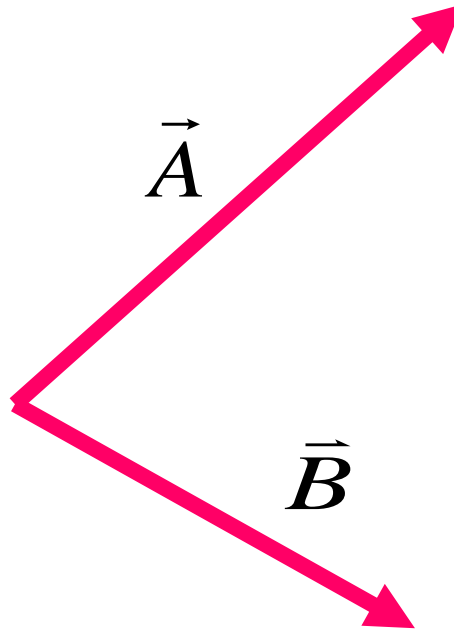


- Vectors have magnitude and direction



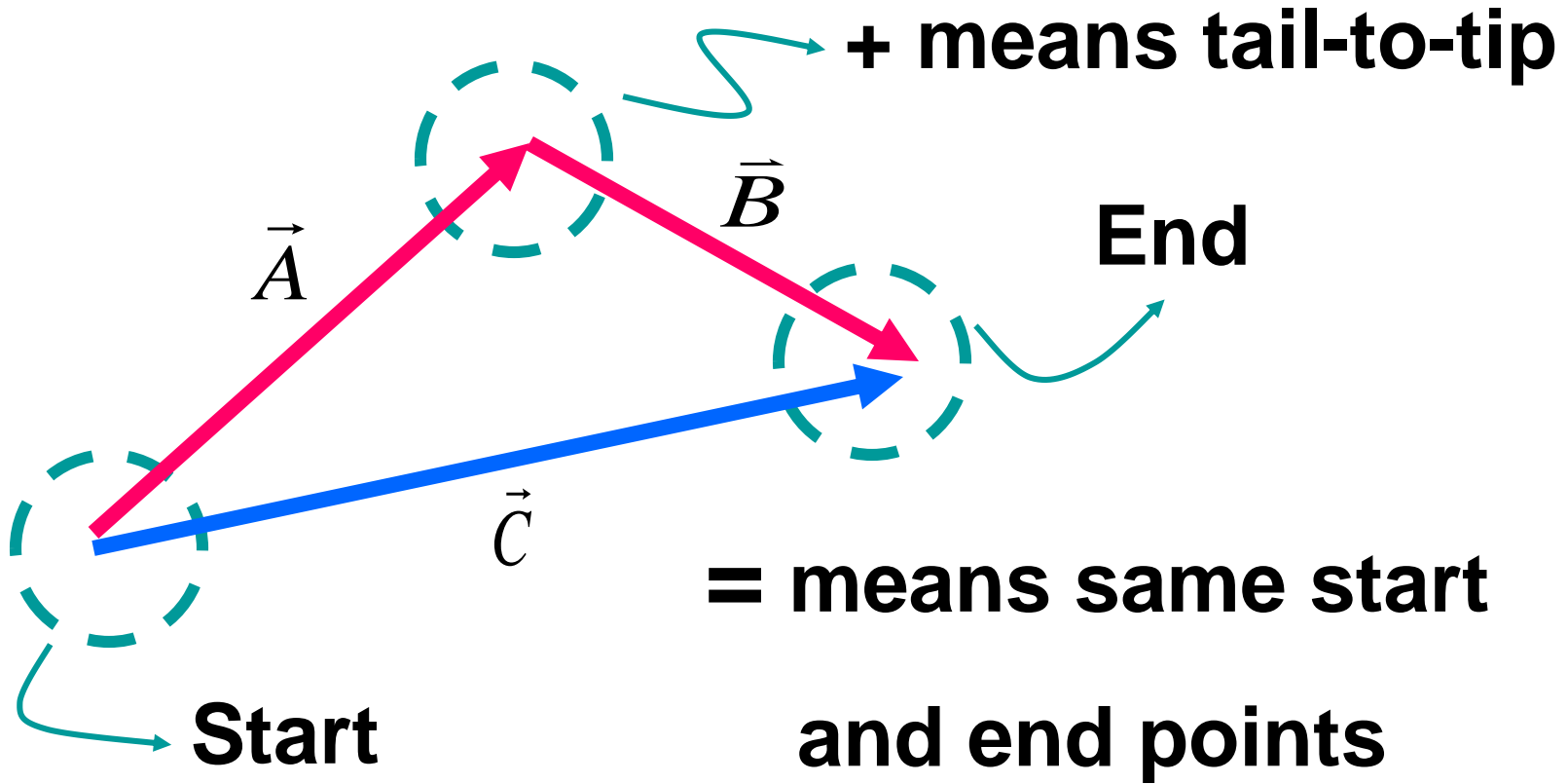
- Symbols:  $\vec{A}$ ,  $\vec{B}$   
Without arrow, just magnitude or size.  $A = |\vec{A}|$



Vectors are often drawn at a common origin to emphasize direction and orientation.

$$\vec{C} = \vec{A} + \vec{B}$$

**+ means tail-to-tip**



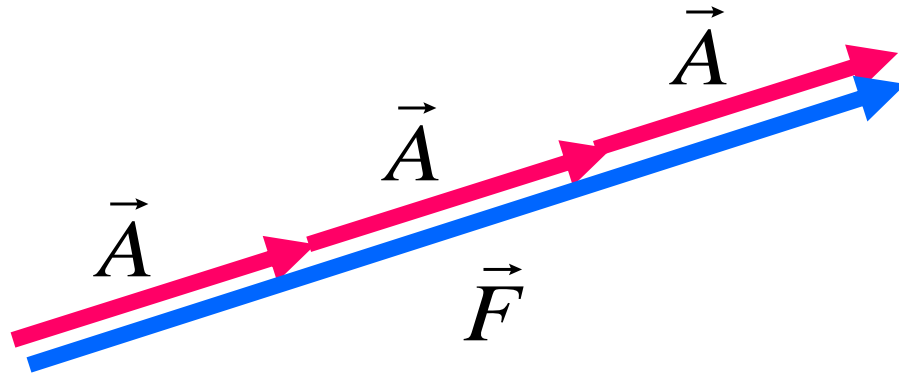
OHQ1

OHQ2

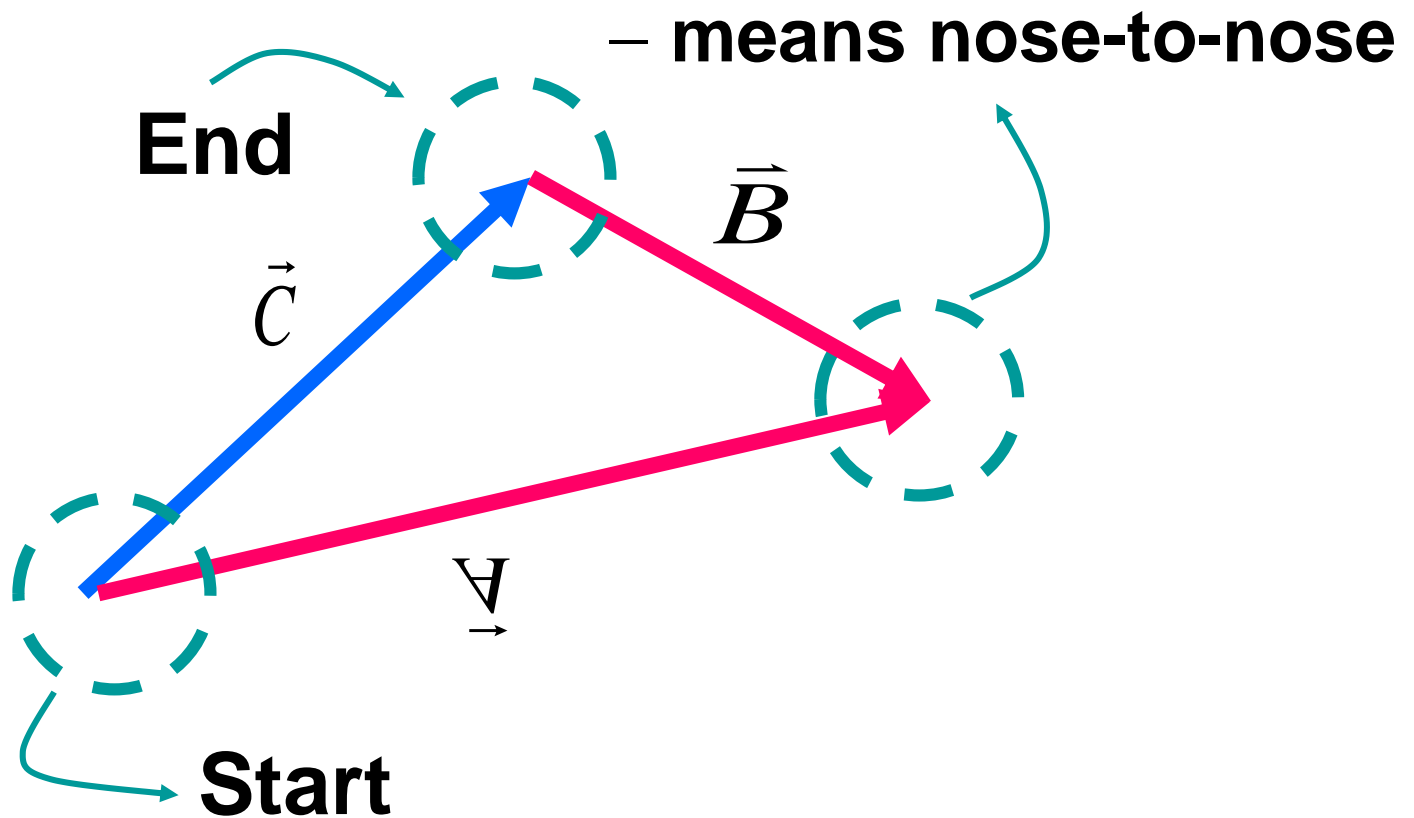
# Multiplication by a scalar

$$\vec{F} = 3\vec{A}$$

$$\vec{F} = \vec{A} + \vec{A} + \vec{A}$$



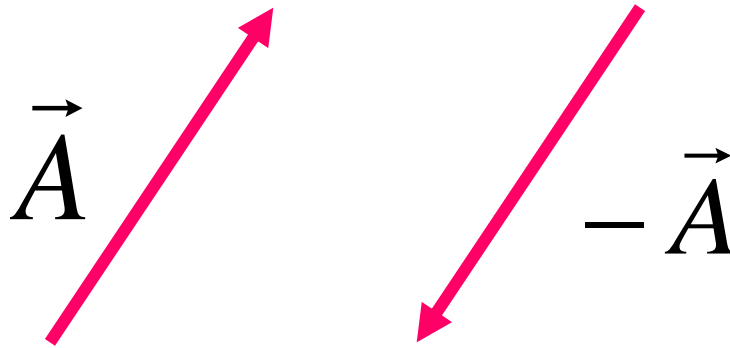
# Subtraction $\vec{C} = \vec{A} - \vec{B}$



$$\vec{A} = \vec{C} + \vec{B}$$

# Negative Vectors

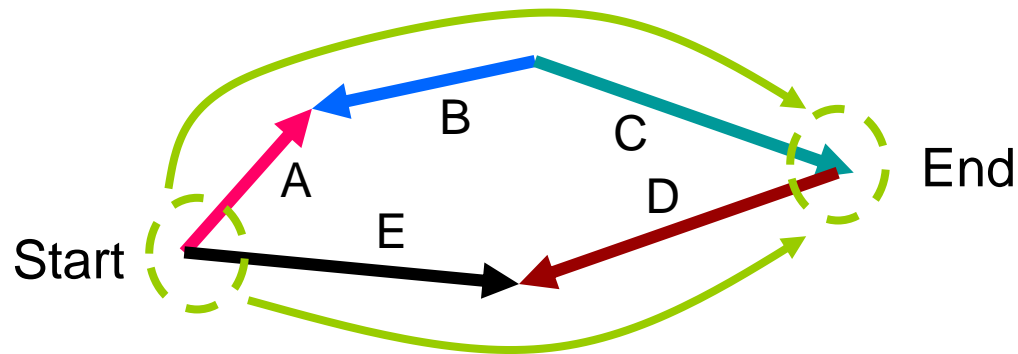
The negative of a vector has the same size but points in the opposite direction.



Note  $\vec{A} + (-\vec{A}) = 0$

# General method

- Pick any start and end points
- Following an arrow in same direction is +
- Follow in opposite direction is –



$$\vec{A} - \vec{B} + \vec{C} = \vec{E} - \vec{D}$$