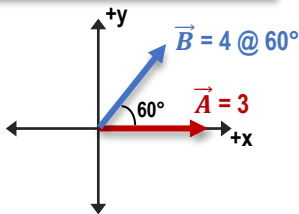


CONCEPT: VECTOR PRODUCT (CROSS PRODUCT) AND THE RIGHT-HAND-RULE

- The Vector (Cross) Product is the 2nd way of multiplying vectors: 1) Scalar Product; 2) Vector Product

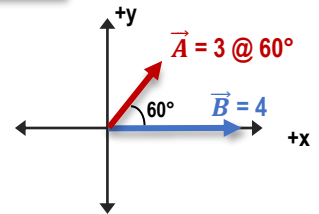
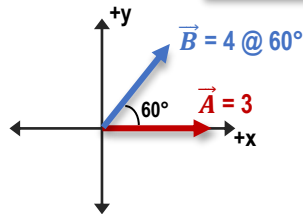
Scalar (Dot) Product



- Produces a [NUMBER | VECTOR]
 - Multiplication of $\vec{A}$ parallel to $\vec{B}$

$$\vec{A} \bullet \vec{B} = |\vec{A}| |\vec{B}| \cos(\theta)$$

Vector (Cross) Product



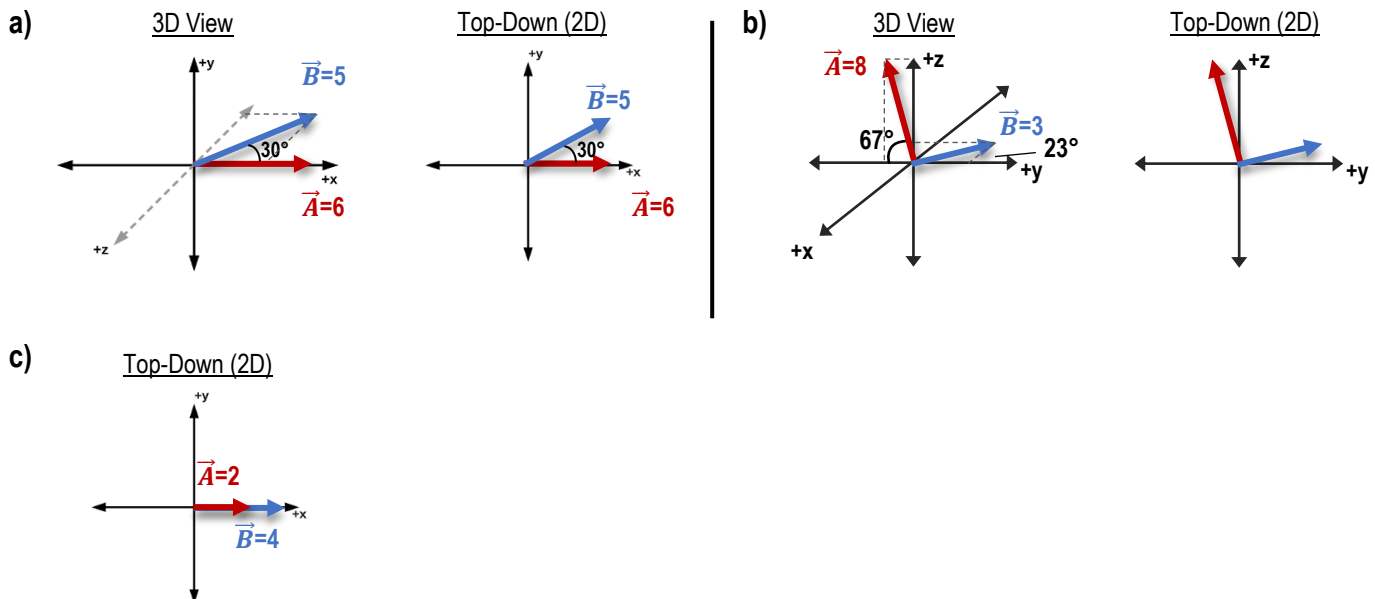
- Produces a [NUMBER | VECTOR] $\vec{C}$ _____ to both $\vec{A}$ and $\vec{B}$

$$\text{Magnitude: } |\vec{C}| = |\vec{A} \times \vec{B}| = \underline{\hspace{2cm}}$$

θ = **smallest** angle measured from $\vec{A}$ to $\vec{B}$

- To find the direction of vector products, use the _____:
 - Always point fingers along 1st vector ($\vec{A}$), curl _____ 2nd vector ($\vec{B}$). Thumb points in direction of $\vec{C}$.
 - The symbol $\odot$ = "out of the page" toward you, while $\otimes$ = "into the page" away from you

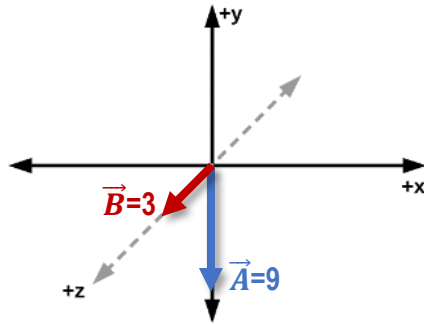
EXAMPLE: Calculate the magnitude and direction of $\vec{A} \times \vec{B}$.



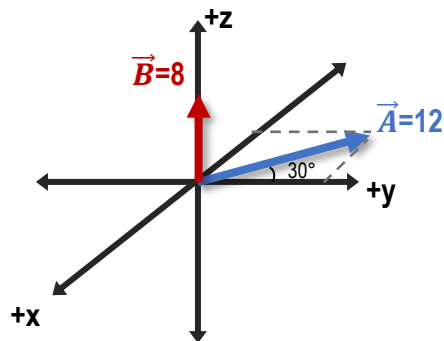
- The cross product $\vec{A} \times \vec{B}$ is ZERO if the vectors are _____ ($\theta = \underline{\hspace{1cm}}$ OR $\underline{\hspace{1cm}}$)

PROBLEM: Find the magnitude and direction of the vector $\vec{C} = 2\vec{B} \times \vec{A}$.

- A) $|\vec{C}| = 27$; along the $-x$ direction
- B) $|\vec{C}| = 27$; along the $+x$ direction
- C) $|\vec{C}| = 54$; along the $+x$ direction
- D) $|\vec{C}| = 54$; along the $+y$ direction
- E) $|\vec{C}| = 19$; along the $+x$ direction



PROBLEM: Find the magnitude and direction of the vector $\vec{C} = \vec{A} \times \vec{B}$. Write the direction of $\vec{C}$ as a positive angle from the x -axis.



PROBLEM: Two vectors $\vec{A}$ and $\vec{B}$ have scalar product -8 , and their vector product has magnitude $+12$. What is the angle between these two vectors?