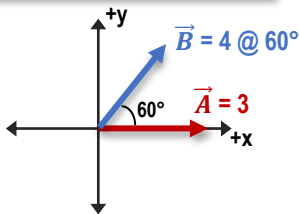## CONCEPT: VECTOR PRODUCT (CROSS PRODUCT) AND THE RIGHT-HAND-RULE

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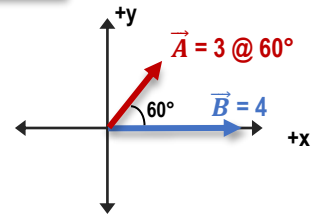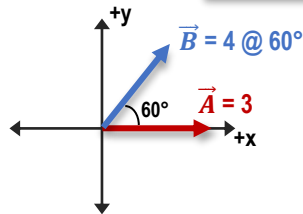
Scalar (Dot) Product	**Vector (Cross) Product**

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

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

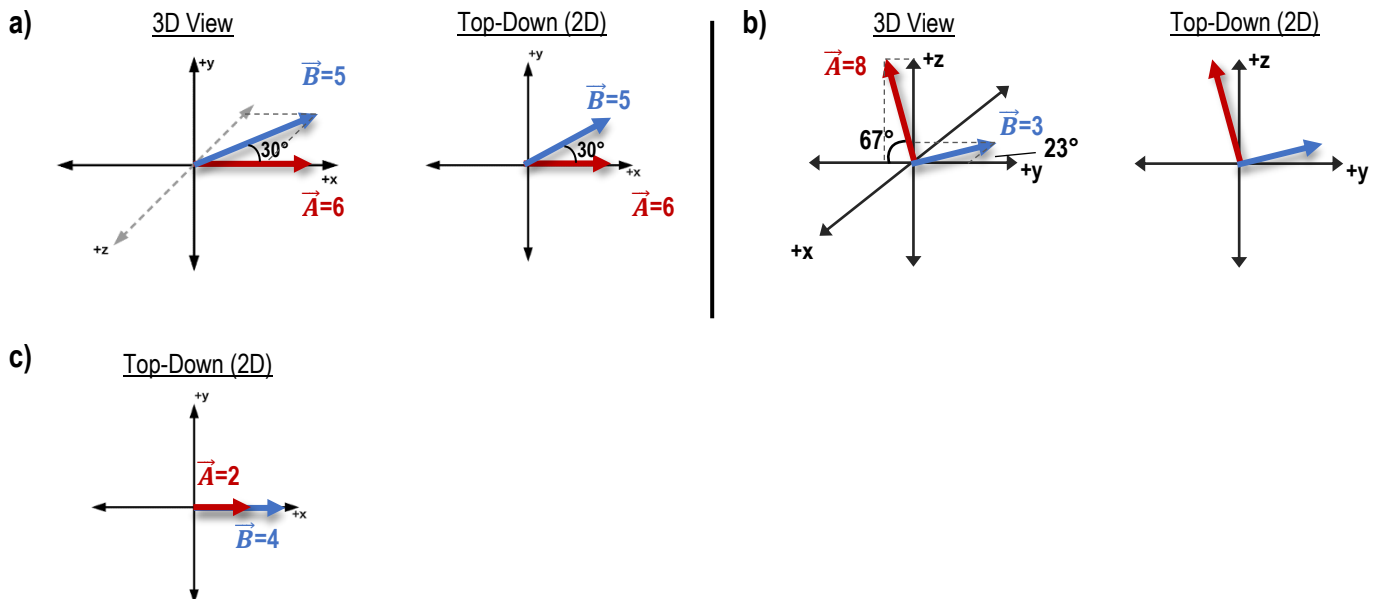● Produces a **[NUMBER | VECTOR]** $\vec{C}$ _____ to both $\vec{A}$ *and* $\vec{B}$

Magnitude: $|\vec{C}| = |\vec{A} \times \vec{B}| =$ _____

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 ___ = "out of the page" toward you, while ___ = "into the page" away from you
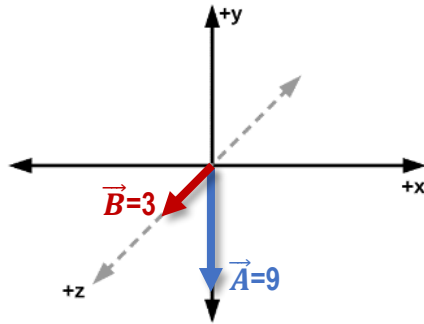
EXAMPLE: Calculate the magnitude and direction of $\vec{A} \times \vec{B}$.

a)

b)

c)

● The cross product $\vec{A} \times \vec{B}$ is ZERO if the vectors are _____ (θ = __ OR ___)

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

+y

+x

$\vec{B}=3$

$\vec{A}=9$

+z

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.

+z

$\vec{B}=8$

$\vec{A}=12$

30°

+y

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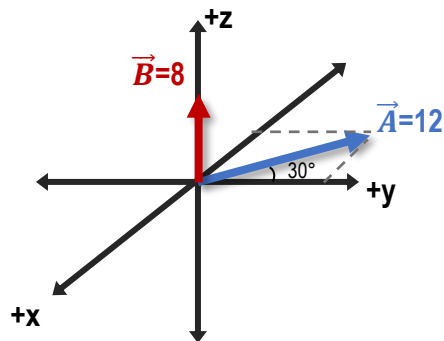
PROBLEM: Two vectors $\vec{A}$ and $\vec{B}$ have scalar product –8, and their vector product has magnitude +12. What is the angle between these two vectors?