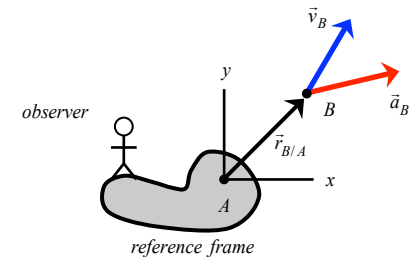


# Summary: 2D Moving Reference Frame Kinematics 1

**PROBLEM:** A person attached to a moving body (reference frame) is observing the motion of point B.

$$\vec{v}_B = \vec{v}_A + (\vec{v}_{B/A})_{rel} + \vec{\omega} \times \vec{r}_{B/A}$$

$$\vec{a}_B = \vec{a}_A + (\vec{a}_{B/A})_{rel} + \vec{\alpha} \times \vec{r}_{B/A} + 2\vec{\omega} \times (\vec{v}_{B/A})_{rel} + \vec{\omega} \times (\vec{\omega} \times \vec{r}_{B/A})$$



where:

- $\vec{\omega}$  is the angular velocity of the observer (no exceptions).
- $\vec{\alpha}$  is the angular acceleration of the observer (no exceptions).
- $(\vec{v}_{B/A})_{rel}$  is the velocity of B as seen by the observer (no exceptions).
- $(\vec{a}_{B/A})_{rel}$  is the acceleration of B as seen by the observer (no exceptions).
- A is ANY point on the same reference frame as the observer.
- Generally, you are free to choose your observer.