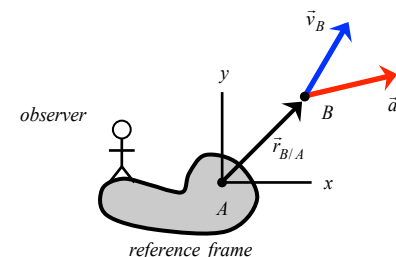# *Summary*: 2D Moving Reference Frame Kinematics 1

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

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

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

where:

- $\vec{\omega}$ is the angular velocity *of the observer* (*no exceptions*).

- $\vec{\alpha}$ is the angular velocity *of the observer* (*no exceptions*).

- $\left(\vec{v}_{B/A}\right)_{rel}$ is the velocity of B *as seen by the observer* (*no exceptions*).

- $\left(\vec{a}_{B/A}\right)_{rel}$ 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.