

## Elementary Dynamics Example #34a: (Rigid Body Kinematics – Instantaneous Centers)

Given:  $\omega_{OA}$

two special configurations of the slider-crank mechanism

Find:  $\omega_{AB}$

Solution:

In the first configuration, the velocities of  $A$  and  $B$  are parallel – both directly left for a counterclockwise  $\omega_{OA}$ . Lines drawn through  $A$  and  $B$  that are perpendicular to the velocities are also parallel and, hence, do not intersect. Link  $AB$  is in purely translational motion at this instant, so  $\omega_{AB} = 0$ .

In the second configuration (shown below), because the slider is at its maximum displacement, the velocity of  $B$  is zero. So,  $B$  is the IC for link  $AB$  at this instant. Recognizing this, the velocity of  $A$  can be written as

$$v_A = R\omega_{OA} = L\omega_{AB} \Rightarrow \omega_{AB} = \left(\frac{R}{L}\right)\omega_{OA}$$

