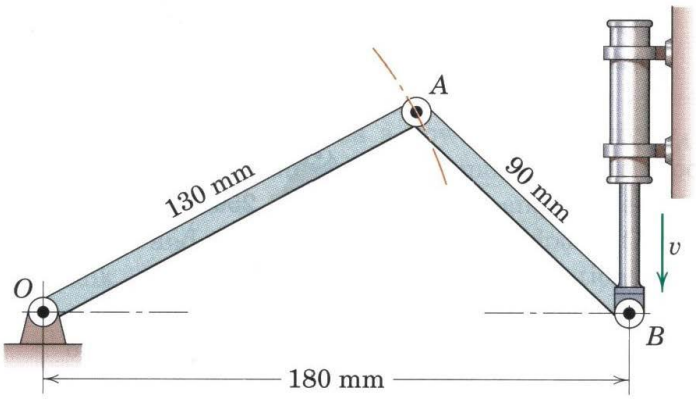
Extra Questions - Velocity analysis using relative velocity equation or instant centre method

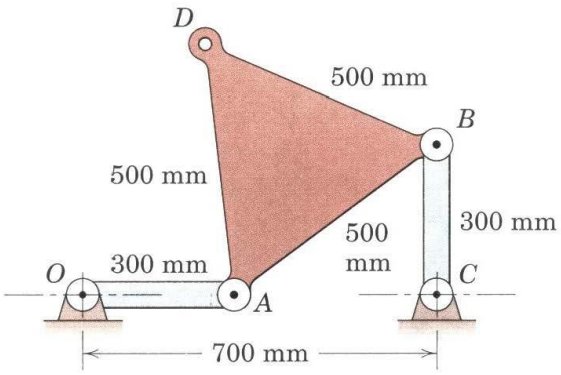
(Meriam & Kraige, 7th edition, SI version)

5/71 For the instant represented point B crosses the horizontal axis through point O with a downward velocity $v = 0.6$ m/s. Determine the corresponding value of the angular velocity ω_{OA} of link OA.



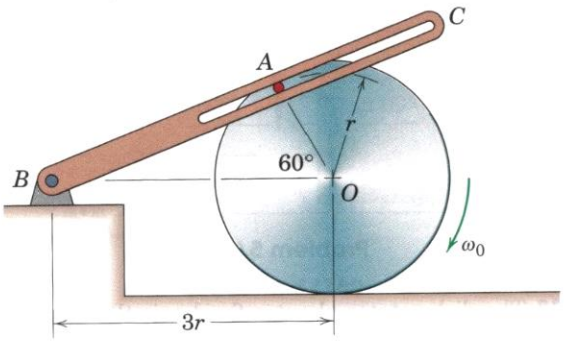
[Answer ω_{OA} = 3.33 rad/s CW]

5/79 At the instant represented the triangular plate ABD has a clockwise angular velocity of 3 rad/s. For this instant determine the angular velocity ω_{BC} of link BC.



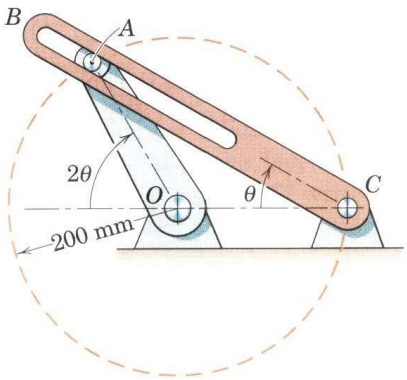
[Answer ω_{BC} = 3 rad/s CW]

5/179 All conditions of the previous problem remain the same, except now, rather than rotating about a fixed center, the disk rolls without slipping on the horizontal surface. If the disk has a clockwise angular velocity of 20 rad/s and a counterclockwise angular acceleration of 5 rad/s^2, determine the velocity ~~and acceleration~~ of pin A relative to the slotted member BC and the angular velocity and ~~angular acceleration~~ of BC. The value of r is 200 mm. Neglect the distance from the center of pin A to the edge of the disk.



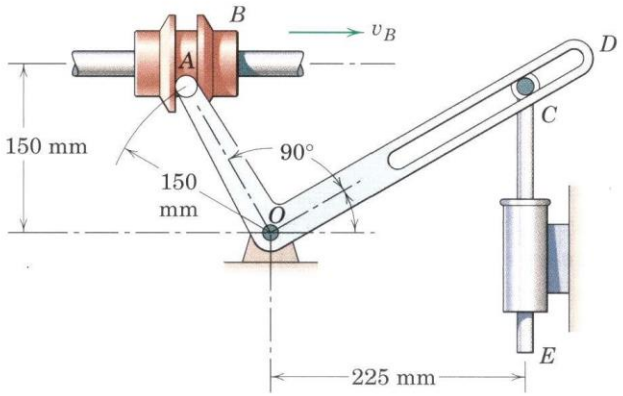
[Answer ω_{BC} = 1.046 rad/s CW; v_{rel} = 7.71 m/s]

5/182 The crank OA revolves clockwise with a constant angular velocity of 10 rad/s within a limited arc of its motion. For the position $\theta = 30°$ determine the angular velocity of the slotted link CB ~~and the acceleration of A as measured relative to the slot in CB~~.



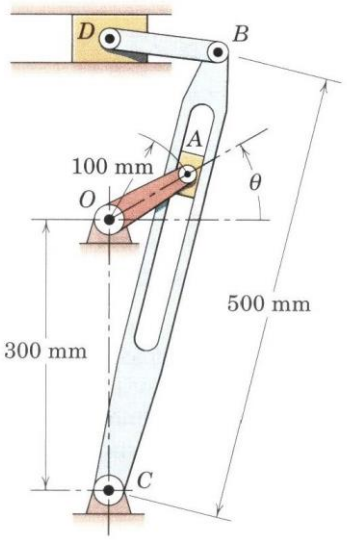
[Answer ω_{BC} = 5 rad/s CW]

5/191 The pin A in the bell crank AOD is guided by the flanges of the collar B, which slides with a constant velocity v_B of 0.9 m/s along the fixed shaft for an interval of motion. For the position $\theta = 30°$ determine the velocity of the plunger CE, whose upper end is positioned by the radial slot in the bell crank.



[Answer v_{CE} = 2.078 m/s]

5/198 The figure illustrates a commonly used quick-return mechanism which produces a slow cutting stroke of the tool (attached to D) and a rapid return stroke. If the driving crank OA is turning at the constant rate $\dot{\theta} = 3$ rad/s, determine the magnitude of the velocity of point B for the instant when $\theta = 30°$.



[Answer v_B = 0.289 m/s]