

Rigid Body Kinematics IV – Problem 4

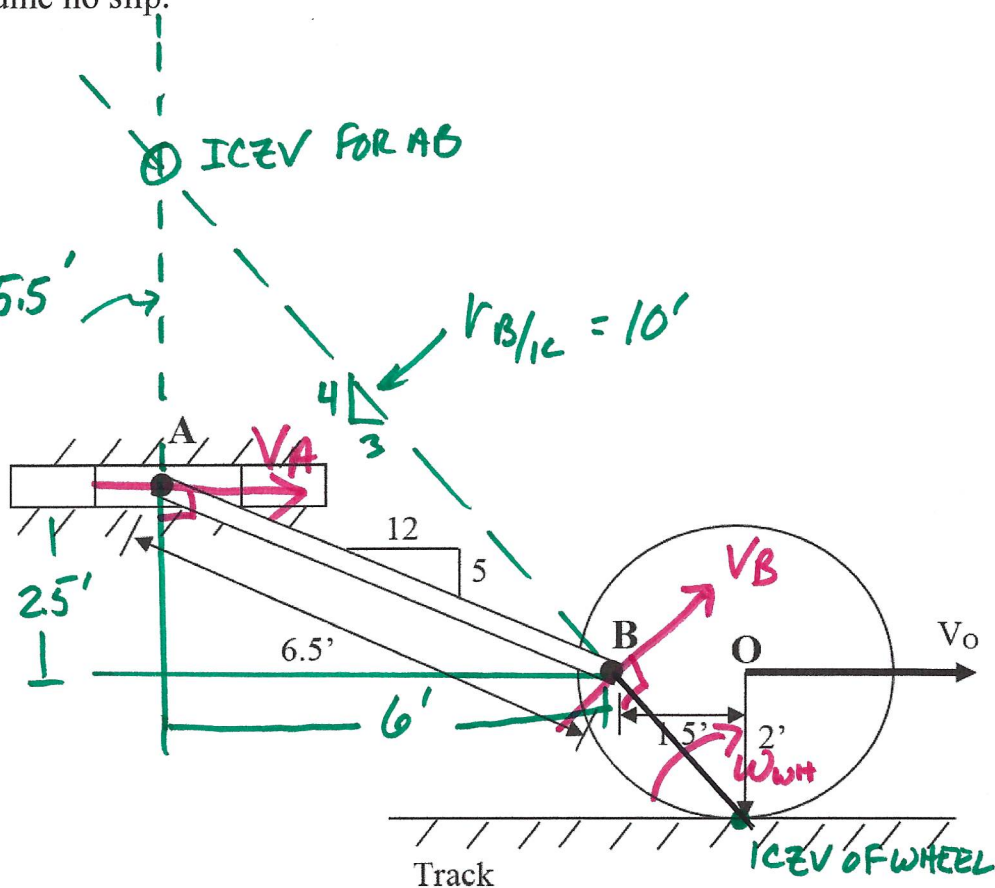
For the train wheel shown, use ICZV to find the velocity of the piston at A relative to the track and the angular velocity of the push arm AB when the velocity of the train is $V_o = 80$ fps. Assume no slip.

CLASSIFY MOTION

WHEEL GPM

BAR AB GPM

PISTON TRANS $r_{A/IC} = 5.5'$



$$V_o = W_{WH} r_{O/IC} \Rightarrow BO = W_{WH} (2) \quad W_{WH} = 40 \text{ rps} \downarrow$$

$$V_B = W_{WH} r_{B/IC} = 40 (2.5) = 100 \text{ Fps}$$

$$V_B = W_{AB} r_{B/ICAB} \Rightarrow 100 = W_{AB} (10) \quad \underline{W_{AB} = 10 \text{ rps} \uparrow}$$

$$V_A = W_{AB} r_{A/ICAB} = 10 \text{ rps} (5.5') = \underline{55 \text{ Fps} \rightarrow}$$