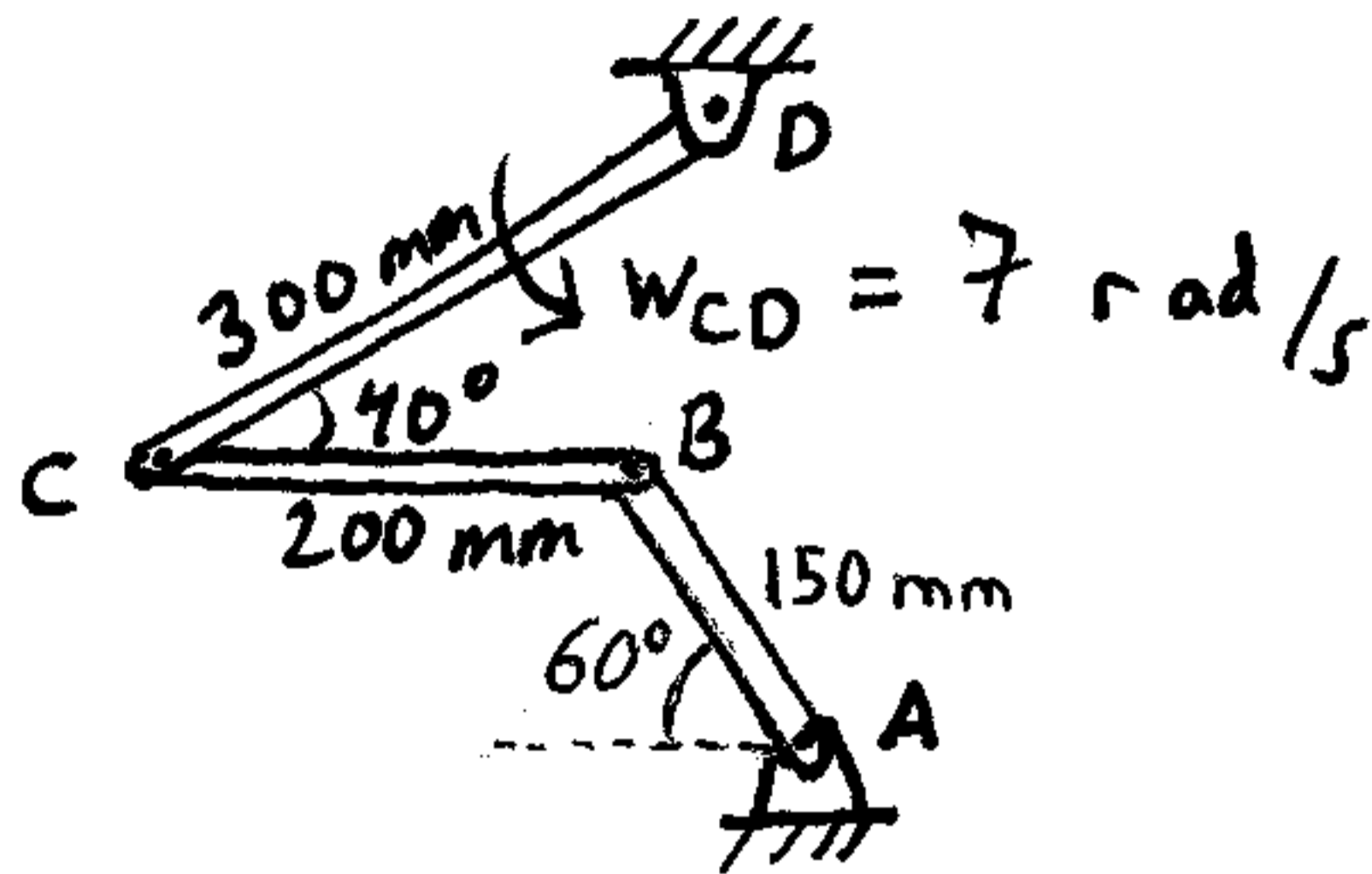
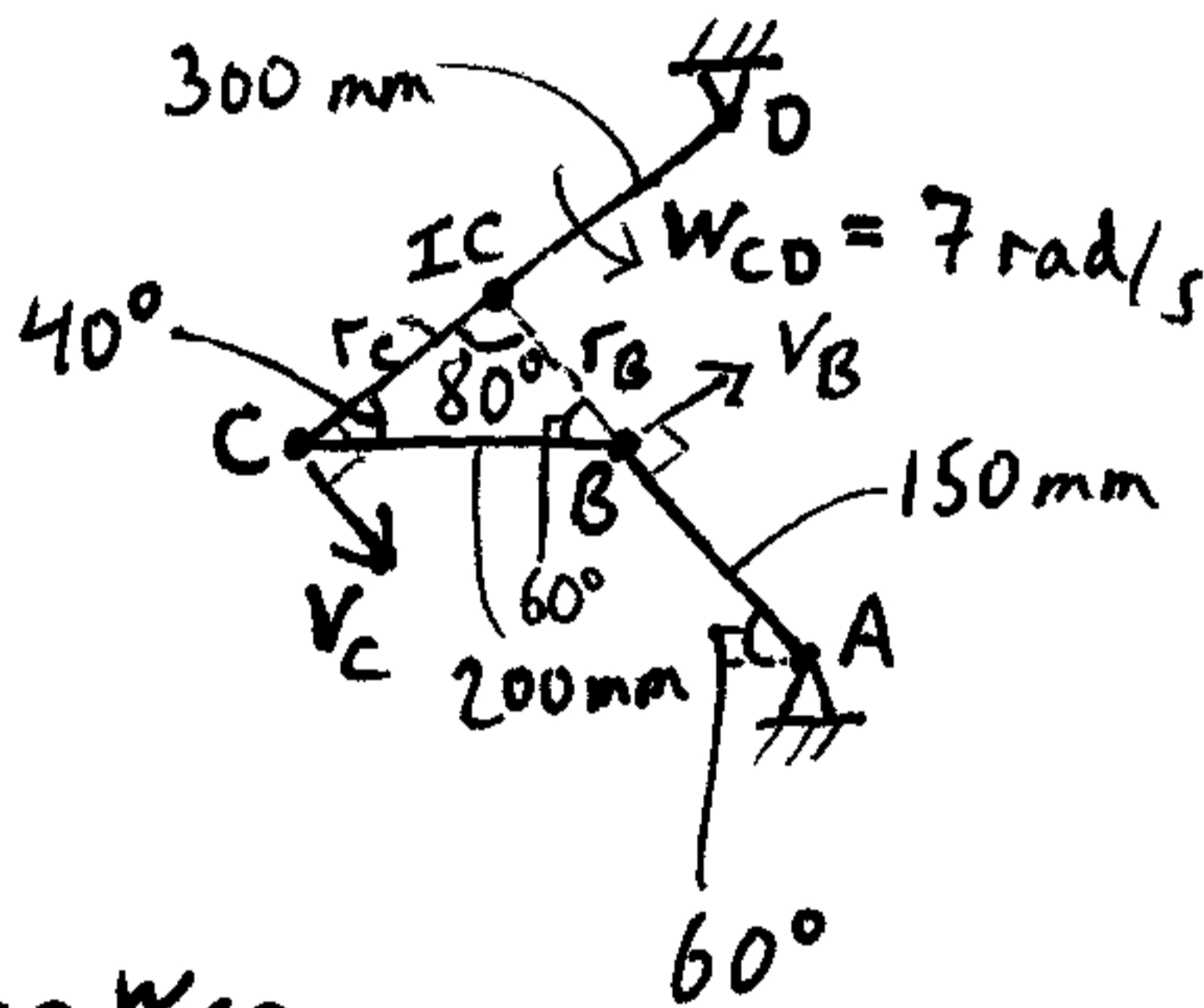


This is a problem involving instant center (engineering mechanics).



If link CD is rotating at $\omega_{CD} = 7 \text{ rad/s}$ in the arrangement shown, what is the angular velocity of links AB and BC at the instant shown?

Solution:



From the law of sines:

$$\frac{200}{\sin 80^\circ} = \frac{r_B}{\sin 40^\circ} = \frac{r_C}{\sin 60^\circ}$$

$$r_B = \frac{200 \sin 40^\circ}{\sin 80^\circ} = 130.54 \text{ mm}$$

$$r_C = \frac{200 \sin 60^\circ}{\sin 80^\circ} = 175.877 \text{ mm}$$

$$v_C = r_{CD} \omega_{CD}$$

$$v_C = (300 \text{ mm})(7 \text{ rad/s})$$

$$= 2100 \text{ mm/s}$$

Now,

$$\omega_{BC} = \frac{v_C}{r_C} = \frac{2100}{175.877} = 11.94 \text{ rad/s} \quad \uparrow$$

(answer)

$$v_B = r_B \omega_{BC} = (130.54)(11.94) = 1558.668 \text{ mm/s}$$

and $\omega_{AB} = \frac{v_B}{r_{AB}} = \frac{1558.668}{150} = 10.39 \text{ rad/s} \quad \uparrow$ (answer)