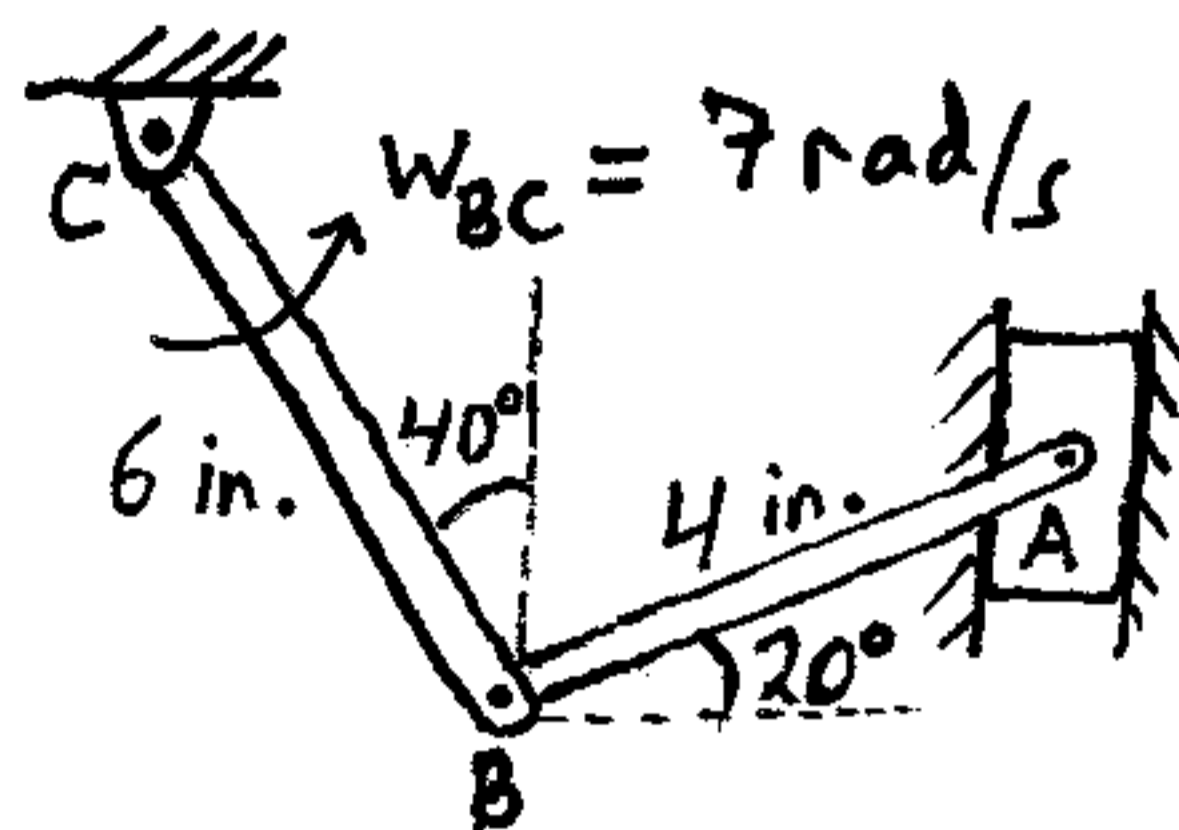


© Franco Normani

real-world-physics-problems.com

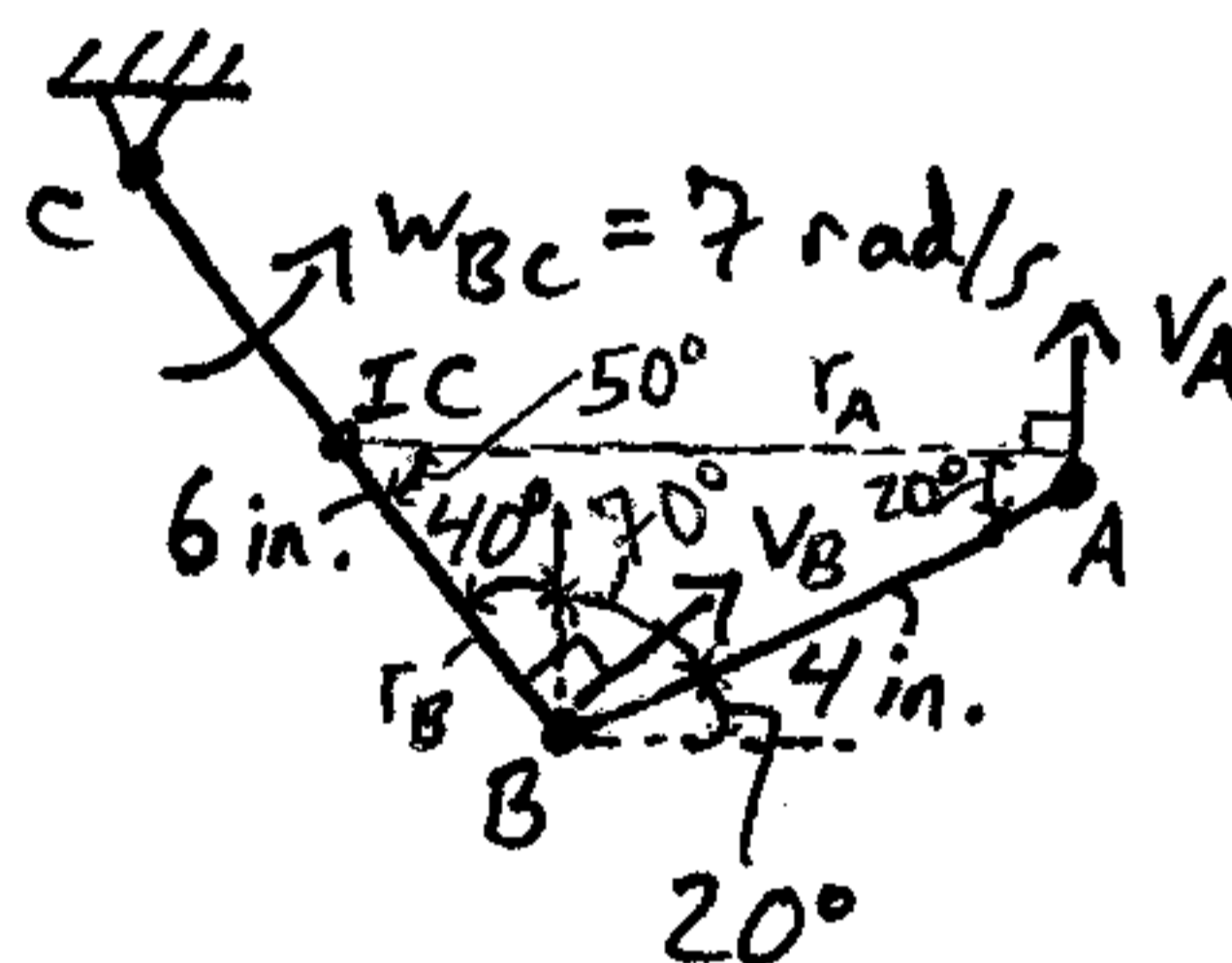
March 27, 2020

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



For the arrangement shown, determine the speed of block A.

Solution:



From the law of sines:

$$\frac{4}{\sin 50^\circ} = \frac{r_A}{\sin(40^\circ + 70^\circ)} = \frac{r_B}{\sin 20^\circ}$$

$$r_A = \frac{4 \sin(40^\circ + 70^\circ)}{\sin 50^\circ}$$

$$r_A = 4.906 \text{ in.}$$

$$r_B = \frac{4 \sin 20^\circ}{\sin 50^\circ}$$

$$r_B = 1.786 \text{ in.}$$

Now

$$v_B = r_{BC} \omega_{BC} = (6)(7) = 42 \text{ in./s}, \quad \omega_{AB} = \frac{v_B}{r_B} = \frac{42}{1.786} = 23.516 \text{ rad/s}$$
$$v_A = r_A \omega_{AB} = (4.906)(23.516) = 115.37 \text{ in./s} \quad (\text{answer})$$