A car initially traveling eastward turns north by traveling in a circular path at uniform speed as in the figure. The length of the arc ABC is 240 m, and the car completes the turn in 39.0 s. find the magnitude of the acceleration when the car is at point B.

Solution

The length of the arc is for a 90 degree or $\left(\frac{\pi}{2}\right)$ radians is $l = r\theta = 240 \text{ m} * \left(\frac{\pi}{2}\right) = 377\ m.$

So the constant speed is $= \frac{l}{t} = \frac{377}{39} = 9.67 \frac{\text{m}}{\text{s}}$.

An acceleration at a uniform speed on a circular curve is $a = \frac{v^2}{r} = \frac{9.67^2}{240} = 0.39 \frac{\text{m}}{\text{s}^2}$.

Answer: $\mathbf{0.39 \frac{m}{s^2}}$.