

A race car is moving at a constant speed of 5.9m/s in a clockwise direction on a circular track of radius 128m. What is in  $\text{m/s}^2$  it's tangential velocity at that time?

The radius of a track is  $R = 128[\text{m}]$  therefore its length is

$$L = 2\pi R = 2\pi \cdot 128[\text{m}] = 256\pi \approx 804.25[\text{m}].$$

As the linear speed of a car is  $V = 5.9[\text{m/s}]$  it takes

$$T = L/V$$

to make a full circle. Therefore, the angular velocity of a car is

$$\omega = 1/T = V/L.$$

So, tangential velocity of a car is

$$V_{\text{tan}} = R \cdot \omega = R \cdot V/L = 128[\text{m}] \cdot 5.9[\text{m/s}] / (256\pi[\text{m}]) \approx 0.939[\text{m/s}].$$

P.S. The dimension of tangential velocity is  $[\text{m/s}]$ , not  $[\text{m/s}^2]$ .