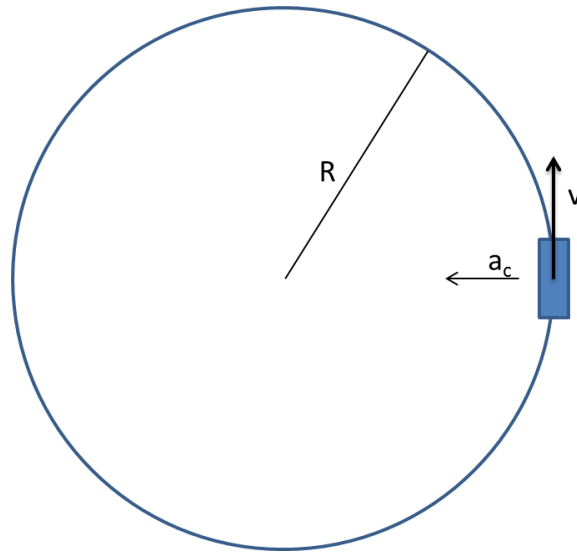


Answer on Question #49036, Physics, Mechanics | Kinematics | Dynamics

A car travels at a constant speed around a circular track whose radius is 3.90 km. The car goes once around the track in 292 s. What is the magnitude of the centripetal acceleration of the car?

Solution.



By definition:

$$a_c = \frac{v^2}{R}$$

Speed of the car is equal to length of the circle divided by time of one revolution:

$$v = \frac{2\pi R}{T}$$

So:

$$a_c = \frac{v^2}{R} = \left(\frac{2\pi R}{T}\right)^2 \frac{1}{R} = \frac{4\pi^2 R}{T^2}$$

Numerically:

$$a_c = \frac{4 \cdot 3.14^2 \cdot 3.90 \cdot 10^3 \text{ m}}{(292 \text{ s})^2} \approx 1.8 \frac{\text{m}}{\text{s}^2}$$

Answer: $a_c = 1.8 \frac{\text{m}}{\text{s}^2}$