

Quiz No. 08 (2014 Summer)

PHYS 203A: College Physics

Date: 2014 Jul 23

(Name)

(Signature)

1. **(20 points.)** Our sun rotates in a circular orbit about the center of the Milky Way galaxy. The radius of the orbit is 2.2×10^{20} m, and the angular speed of the sun is 1.2×10^{-15} rad/s.
 - (a) How long (in years) does it take for the sun to make one revolution around the center?
 - (b) What is the linear speed of the sun?
2. **(20 points.)** A person is riding a bicycle, the wheels of a bicycle have an angular velocity of $+22.5$ rad/s. Then, the brakes are applied. In coming to rest, each wheel makes an angular displacement of $+10.0$ revolutions.
 - (a) How much time does it take for the bike to come to rest?
 - (b) What is the angular acceleration of each wheel?
3. **(20 points.)** An auto race takes place on a circular track. A car completes one lap in a time of 18.5 s, with an average tangential speed of 43.1 m/s.
 - (a) Find the average angular speed of the car.
 - (b) Find the radius of the track.
4. **(40 points.)** The blades of a ceiling fan have a radius of 0.402 m and are rotating about a fixed axis with an angular velocity of $+1.51$ rad/s. When the switch on the fan is turned to a higher speed, the blades acquire an angular acceleration of 1.96 rad/s². After 0.510 s have elapsed since the switch was reset, what is
 - (a) the angular velocity of a point on the tip of a blade?
 - (b) the magnitude of the centripetal acceleration of a point on the tip of a blade?
 - (c) the magnitude of the tangential acceleration of a point on the tip of a blade?
 - (d) the magnitude of the total acceleration (in m/s²) of a point on the tip of a blade?
 - (e) the angle ϕ between the total acceleration \mathbf{a} and the centripetal acceleration \mathbf{a}_c ?