

Assignment Preview

[Close this window](#)

Course: Physics 401, Summer 1 2004

Dates:

Available: Fri Jun 11 2004 11:10 PM EDT

Due: Thu Jun 17 2004 11:59 PM EDT

Homework 7

1. CJ6 8.P.002. [294434] A pitcher throws a curveball that reaches the catcher in 0.53 s. The ball curves because it is spinning at an average angular velocity of 310 rev/min (assumed constant) on its way to the catcher's mitt. What is the angular displacement of the baseball (in radians) as it travels from the pitcher to the catcher?

[17.2] radians

A pulsar is a rapidly rotating neutron star that continuously emits a beam of radio waves in a searchlight manner. Each time the pulsar makes one revolution, the rotating beam sweeps across the earth, and the earth receives a pulse of radio waves. For one particular pulsar, the time between two successive pulses is 0.072 s. Determine the average angular speed (in rad/s) of this pulsar.

[87.3] rad/s

3. CJ6 8.P.006. [294540] A Ferris wheel rotates at an angular velocity of 0.22 rad/s. Starting from rest, it reaches its operating speed with an average angular acceleration of 0.033 rad/s². How long does it take the wheel to come up to operating speed?

[6.67] s

4. CJ6 8.P.020. [239611] The angular speed of the rotor in a centrifuge increases from 320 to 1320 rad/s in a time of 5.00 s.

(a) Obtain the angle through which the rotor turns.

[4100] rad

(b) What is the magnitude of the angular acceleration?

[200] rad/s²

At the local swimming hole, a favorite trick is to run horizontally off a cliff that is 8.3 m above the water. One diver runs off the edge of the cliff, tucks into a "ball," and rotates on the way down with an average angular speed of 1.8 rev/s. Ignore air resistance and determine the number of revolutions she makes while on the way down.

[2.34] rev

6. CJ6 8.P.028. [239614] 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) What is the tangential speed of the sun?

[2.6e5] m/s

(b) How long (in years) does it take for the sun to make one revolution around the center?

[1.7e8] y

7. CJ6 8.P.032. [294469] An auto race is held on a circular track. A car completes one lap in a time of 18.9 s, with an average tangential speed of 46.7 m/s. Find the following.

(a) the average angular speed

[0.332] rad/s

(b) the radius of the track

[140] m

8. CJ6 8.P.038. [239617] A ceiling fan has two different angular speed settings: $\omega_1 = 430$ rev/min and $\omega_2 = 150$ rev/min. What is the ratio a_1/a_2 of the centripetal accelerations of a given point on a fan blade?

[8.22]

9. CJ6 8.P.046. [239618] An automobile tire has a radius of 0.260 m, and its center moves forward with a linear speed of $v = 12.0$ m/s.

(a) Determine the angular speed of the wheel. (Assume that there is no slipping of the surfaces in contact during the rolling motion.)

[46.2] rad/s

(b) Relative to the axle, what is the tangential speed of a point located 0.175 m from the axle?

[8.08] m/s

10. CJ6 8.P.053. [239621] A ball of radius 0.360 m rolls along a horizontal table top with a constant linear speed of 3.70 m/s. The ball rolls off the edge and falls a vertical distance of 2.30 m before hitting the floor. What is the angular displacement of the ball while it is in the air? (All problems in this section assume that there is no slipping of the surfaces in contact during the rolling motion.)

[2] [7.04] rad

[Submit for Testing](#)

Preview Tools

[Show All](#)

In View: [Key](#)

[Hide All](#)

Hidden: [Score](#) | [Mark](#) | [Help/Hints](#) | [Solution](#)

[Show new Randomization](#) | [Print page](#)