

Physics Assignment for 01/07/08

Term/Formula List:

circular motion

rotational motion

arc length, $s = r\theta_{\text{rad}}$

radian

angular displacement

$2\pi \text{ rad} = 360^\circ$

angular velocity, $\omega_{\text{avg}} =$

angular acceleration, $\alpha_{\text{avg}} =$

$v = r \omega$

$$a_c = \omega^2 r$$

$$F_c = m \omega^2 r$$

torque

$$T = F r$$

radial distance

Law of Torque, $T = I \alpha$

moment of inertia

rotational inertia

Homework Assignment:

Day 1: Read pgs 209 - 214; Questions 1, 2, 3, 9; Problems 1, 2, 3, 7
Convert from radians to degrees problems

Day 2: Read pgs 214 - 218; Questions 10, 15; Problems 8

Day 3: Read pgs 218 - 222; Questions 16, 18, 22, 23; Problems 9, 10, 14

Day 4: Do At Home Lab #10; T.Y pg 111 #1, 10, 11, 16, 18

Day 5: From Chapter 13 – write definitions for the following and **turn in at class**:
Kepler's 3 laws of motion, universal law of gravitation (a formula), CG, CM,
terminal velocity, critical velocity, escape velocity;
Complete lab book to be turned in - #10, #11
Study for quiz and midterm Ch 1 - 13

My sibling was asking me about the orbits of planets and the amount of area swept in any given time. I had to ask him, "Am I my brother's Kelper?"

Convert from radians to degrees:

1. $\pi \text{ rad} =$

2. $9.42 \text{ rad} =$

3. $15.0 \text{ rad} =$

At Home Lab:

(Refer to pgs 210-211 in book. Call or e-mail me if you need help.)

Lab #11 Working with radians

A radian is the angle formed by an arc whose length is equal to the radius of the circle which the arc is upon. We will be using radians when studying rotary motion. A radian measurement is the angular displacement or the size of the angle traveled. With this lab you will determine the size of the angle that is equal to 1 radian and how many radians make up one complete circle.

Select two cylindrical objects of different sizes and perform the following measurements on both.

step 1: Measure the radius of the base. Mark the distance of the radius on the rim of the object. Measure the angle formed by connecting the start/end points on the rim to the center of the base.

step 2: Roll the object 1 radian. Measure the distance traveled.

step 3: Roll the object 1 full rotation. Measure the distance traveled.

Evaluate the results.

Part 1: size of the angle that is equal to 1 radian

Look up the degree value for 1 radian in your book or notes.

How close was your measured values in **step 1** to 1 radian for each object?

Verify that what you did in **step 1** agrees with the definition of a radian.

What would be the formula for the arc length (s) in terms of the radius (r) and the angle rotated (Θ_{rad}) ?

Part 2: how many radians equal 1 full rotation

In **step 2** you measured the distance traveled by the object for 1 radian of rotation. For each object, calculate how many radians of rotation are needed to travel the distance in **step 3**.

Write this amount in terms of π .

What is the formula for the circumference of a circle?

Name any similarities between the # of radians needed for 1 rotation and the formula for a circle's circumference?

If it takes 1 radian of rotation to travel the distance equal to the radius, how many radians of rotation are needed to travel the distance equal to the circumference?