

HW#6: Circular motion (Due 11 pm **central time**, 10/21, Tuesday).

HW hint posted on course web (<http://web.njit.edu/~kenahn>)

Common exam 2 on Oct 31st, Friday

8:30 - 9:45 A.M. (Arrive by 8:15am)

KUPF 209

Exam covers B1 Chapter 4, B2 Chapter 6 Sect 1-4

Bring scientific calculators

No office hour today due to a meeting

1

Last class...

B2. Ch6. Sec.1-2 : Circular Motion

Uniform Circular Motion

More on Uniform Circular Motion

Non-uniform Circular Motion

Today.. Examples for circular motions

Objects moving through liquid or gas : resistive forces

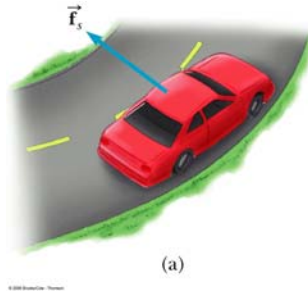
(Sect. 6.4 in B2)

Examples

2

Example: Car moving along a curved horizontal road (see note)

A 1000 kg car moving on a horizontal road negotiates a curve with a radius 20 m. If the coefficient of static friction is 0.5 between the road and tire, what is the maximum speed the car can have to make the turn successfully?



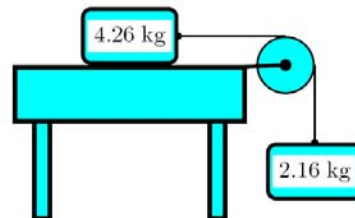
3

Example: Two objects moving together

007 (part 1 of 2) 8 points

A block of mass 4.26 kg lies on a frictionless horizontal surface. The block is connected by a cord passing over a pulley to another block of mass 2.16 kg which hangs in the air, as shown on the following picture. Assume the cord to be light (massless and weightless) and unstretchable and the pulley to have no friction and no rotational inertia.

The acceleration of gravity is 9.8 m/s^2 .



Calculate the acceleration of the first block. Answer in units of m/s^2 .

008 (part 2 of 2) 7 points

Calculate the tension in the cord. Answer in units of N.

4

Objects moving through liquid or gas : resistive forces (Sect. 6.4 in B2)

For object falling slowly through a liquid, or

for very small objects, such as dust particles, moving through air

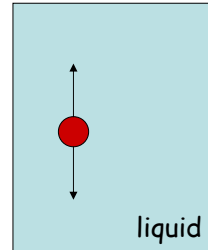
$$\rightarrow \text{Resistive force} = \vec{R} = -b\vec{v}$$

b = resistive force proportionality constant

v = velocity

Terminal velocity for a falling object

$$v_T = \frac{mg}{b} \quad \text{from } bv_T - mg = 0$$



5

Example

A small sphere of mass 0.002 kg is released from rest in a large vessel filled with oil, where it experiences a resistive force proportional to its speed. The resistive force proportionality constant is 0.392 kg/s. Find the terminal speed of the sphere.

6