Physics circular motion

Science, Physics

II Uniform Circular Motion A. Nomenclature 1. Speed — magnitude of an objects rate of motion (no direction, scalar quantity) 2. Velocity — speed and direction of an objects motion (vector, mag & direction) 3. If a car's speed is constant but direction is changing, velocity is changing. 4. 2 ways to change velocity (change speed or change direction). 5. acceleration — change in speed over time (vector quantity) TWO types; a. Linear acceleration — speed up or slow down b. Centripetal acceleration — change direction B. Centripetal acceleration (ac) — acceleration changes due to change in direction. 1. Centripetal means center seeking 2. ac is always directed toward the center of the curved path (circle) 3. If an object is moving in a circle it will always have a centripetal acceleration 4. ac = v2/r v= velocity tangent to the circle (m/s) r = radius of the circle (m) C. Centripetal Force — the force that causes and maintains circular motion 1. Centripetal Force — Fc — psuedo-force (various forces act as center seeking force) 2. Fc — direction always toward the center. 3. Fc= mac (sub ac = v2/r) 4. Identify Fc a. Rope over your head b. Car rounds a corner c. Earth — Moon d. Gravitron machine (Fn) e. Loop de loop (Fn Fg) f. Swing set ride (Ftx) D. Practice Problems in workbook p 57 then regents practice 8 questions Additional Problems 7) A 13, 500 N car traveling at 50. 0 km/h rounds a curve of radius 2. 00 x 10 2 m. find the following. a) the ac b) the fc c) the minimum coefficient of static friction μ a) 0. 96 m/s2 b)1322 N c) μ= 0. 09 8) In the gravitron machine a cylinder with a diameter of 6 meters is set in rotation with a tangential velocity of 15 m/s. When the floor drops away, riders are suspended against the wall in a vertical position. Calculate the minimum coefficient of friction between the rider and the wall. The normal force is the force centripetal, find

the Fc and plug into friction equation as the Fn Ff = Fc μ mg = m (v2/r) μ

(masses cancel out) 9. 81 m/s2 = ((15 m/s)2 / 3m) μ μ= 0. 13