Unit 1 Test # 2 Review (Forces and Motion)

SPH 4U1

1. Ramps (Inclined Planes)

~ Fgx = mgsinθ

~ Ff = µFN

~ FN = Fgy = mgcosϴ

1. Strings and Pulley’s

~ assumptions: massless string, frictionless pulley, tension is constant, string does not stretch

~ Draw FBD of all objects and substitute to solve for a and T if friction is involved.

~ Type 1 (no friction) T = (m1m2/m1+m2)g

~ Type 2 (no friction) “Atwood Machine” T = 2gm1m2/(m1+m2)

1. Circular Motion (centripetal forces)

~ Fc = mv2/r Fc = m4π2r/T2 Fc= m4π2rf2 {Note: ac = Fc/m}

 Linear velocity v = 2πr/T or 2πrf

 Angular velocity is frequency

~ centripetal acceleration is directed towards the centre of the circle of radius r

~ Horizontal circles involving Tension, or geosynchronous orbits, or friction if on flat curves

~ Also conical circles vs flat circles

~ Geosynchronous Orbits Fg = Fc to stay in orbit where Fg = Gm1m2/r2

1. Vertical Circles

~ Top of swing feel a decrease of force acting on you. T = Fc – Fg

~ Bottom of swing feel an increase of force acting on you. T = Fc+Fg (if flying need a g suit if flying to keep blood in your head not in your extremities)

~ critical velocity you need at the top to stay in the circle is if T approaches 0 and Fc = Fg v = (rg)1/2

~ apparent weight is found at the bottom of a dive at the velocity you are travelling at the bottom of the circle

1. Banked Curves

~ tanϴ = v2/gr gives the critical velocity to stay in the curve with no friction needed.