Physics _____ **Instructor: Barton Clark**

Sir Francis Drake High School **name here please** **Fall 2014**

Rocks over your head lab (a.k.a: Text-book centripetal force lab).

Students swung a mass at the end of a string in a vertical plane. Based on the length of the string (technically, radius runs from "center of mass" to "center of students circular motion") and the mass of the object, students can determine the tangential velocity at which the tension in the string goes to zero (at the top of the path: where Fc = Fg = mv^2/r). **Based on this, students were to <u>predict the period of rotation</u> for their mass-on-string system and then <u>compare to the measured value</u>.**

Added complexity: The textbook problems ask students to assume that the rotational velocity is constant. But i*t aint constant! In order to incorporate the increase in speed as the mass falls, we must turn to principals of conservation of energy (chpt 6, sections 6.3: kinetic energy and 6.4: potential energy).*

The "deliverable": what are you going to hand in? Ans. 1-2 page lab summary. In Clark's world, a lab summary is simply a clean "progression of ideas".. (not a full blown lab report, no hypothesis, no discussion, just a bare-bones, sequence of ideas.. Each "step" begins with a sentence or two describing the purpose of the step, then lays out the diagram/math which explains the step, then the equations with appropriate values, then the answer to the step. Lab summaries always start with a short paragraph describing both the stated objective as well as any underlying principals which are explored in the lab.

What follows is simply a quick overview of the sequence of events we discussed in class.

Though the mass is moving horizontally at this predicted velocity at the top of path, it will fall through "d".. (the diameter of the circle) and pick up additional speed. The amount of speed increase from top to bottom, can be determined based on the principal of conservation of energy (PE grav => KE).

Students then measured the period of rotation of their mass (at the speed at which tension goes to zero at the top, which the students can feel/see when they are spinning it).

Note: the period of rotation (and hence the tangential velocity) measured will be the average velocity (which varies between the minimum value at the top and the maximum value at the bottom).

After collecting data and performing math steps to show predicted period of rotation and velocity, students will calculate percent error (predicted being considered "the right answer") Rocks over your head lab (a.k.a: Text-book centripetal force lab).