SKY COASTER AND THE PENDULUM

The Sky Coaster gives riders that exciting sensation of skydiving or hang gliding as the ride reaches speeds up to 50 miles per hour. The falling, then climbing of the ride repeats as it swings riders back and forth just like a swinging pendulum. Watch riders on the Sky Coaster to best answer the following questions and to better understand simple pendulum motion.

Useful Equations

$$T = 2\pi \sqrt{\frac{L}{g}} \qquad g = 9.8 \frac{m}{s^2}$$

Questions

1. Using the iPhone or iPod "Stopwatch Analog+Digital" or the Android "StopWatch and Timer" application, measure the period of the first full swing starting immediately after the riders are released. Measure this for three sets of riders, then calculate the average.

   T_1=_____s T_2=_____s T_3=_____s T_{avg}=_____s

2. Does the period depend on the mass of the riders? Explain why or why not.

3. Based on the average period (found in question one), for one oscillation of the Sky Coaster riders, calculate the length of the Sky Coaster cables.

4. Measure the angle of the rider's using the iPhone or iPod "Multi Protractor" or Android "Advanced Protractor" application. Align the protractor point of rotation with the fulcrum of the ride. Then, using the length of the cables found above and assuming the riders hang 5 meters above the ground when at rest, determine how high off the ground, "h," the riders are at the point "P" (right before the riders fall back from the initial swing to the starting point) below.

P

h=?
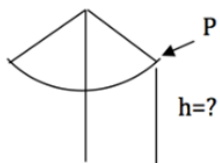
5. What happens when you are not 90 degrees from the ride when measuring the angle with the inclinometer?