The Wild Mouse

The Wild Mouse is a deceptively exciting ride! From the ground the car seems to be moving at a relatively slow speed - and it is, compared to the speeds of most coasters. But, the screaming of the passengers as they progress through the ride provides a clue to the thrills that you'll experience. For this activity, we'll concentrate on the series of switchbacks at the top of the ride.

NOTE: FOR COMFORT (AND SAFETY) YOU MAY WANT TO TAKE A TEST RIDE TO SEE WHAT CHALLENGES YOU'LL HAVE IN MAKING THESE MEASUREMENTS.

Question: When moving along the curves at the top of The Wild Mouse (the switchbacks), the riders feel as if they are going to fall over the edge. How many "g's" of centripetal acceleration are the riders experiencing as they make these turns?

Prediction: The riders will be feeling (0.5, 1.0, 1.5, 2.0, greater than 2.0) g's of acceleration as they whip around the switchback curves. (choose one).

Try It!!: We'll determine the centripetal acceleration in two different manners.

A. On the ride: place the horizontal accelerometer on a level surface (maybe, on the lap bar?) with the **80°** mark facing toward the **right** side of the car. Before reaching the turns, note which of the three BB's is on the 0° mark when the accelerometer is level. As you go around each **left-hand** curve at the top of the ride (the switchback sections), note the maximum angle reading that the BB reaches. Record these measurements below and determine the centripetal acceleration in g's.

1st left-hand turn reading: θ = ____________°

Centripetal Acceleration, $a_c = \tan\theta$ = ____________ g's

2nd left-hand turn reading: θ = ____________°

Centripetal Acceleration, $a_c = \tan\theta$ = ____________ g's

3rd left-hand turn reading: θ = ____________°

Centripetal Acceleration, $a_c = \tan\theta$ = ____________ g's

B. From the ground: Determine the beginning and end of the half-circle that the car makes as it goes around a turn. Using the radius given in the Engineering Specifications below, calculate the distance traveled by the car for the half-circle.

Distance around the half-circle = $2 \bullet \pi\ r$ = _________ meters

Use the stop watch to determine the time it takes for the car to traverse the half-circle. Take at least three trials. Record the average reading below and calculate the speed of the car for the turn. Then calculate the centripetal acceleration.

Time to travel the half-circle (t) = _______ seconds

Speed of the car (v) = Distance around the half-circle ÷ Time = _______ m/s

Centripetal Acceleration (a_c) = v_2 / r = _______ m/s_2

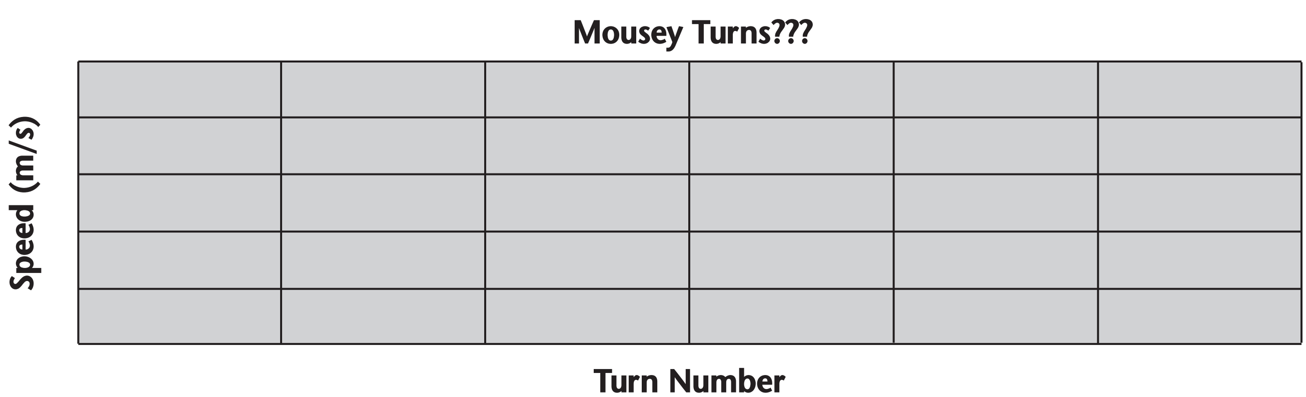
Observations/Conclusions:

(a) How do the centripetal accelerations in parts (A) and (B) compare?

(b) Do all three turns create the same accelerations?

(c) How does the numerical result compare to how you feel on the ride?

Graph It!!: Draw a rough graph below showing the **actual** speeds (with a solid line) for each of the turns of the switchback section AND the speeds you **think** you are going (with a dotted line).



Engineering Specifications: Radius of turns = 2.74 meters