The Carrousel

A mild ride for winding down or just taking it easy after some challenging rides.

Questions: Where does a rider experience the greatest centripetal acceleration on this ride: on the horses closest to the center or the ones farthest out? What are the speeds and accelerations of a rider at each position?

Predictions:

(1) A rider experiences the greatest acceleration on the (inner ring, outer ring). [Circle one.]

(2) I estimate the acceleration of a rider on the inner ring to be _____ g's and the acceleration of a rider on the outer ring to be _____ g's.

Try It !!: You can answer the Questions in two ways. Please use both methods.

From the ground: Using the data in the Engineering Specifications below, calculate the speeds and accelerations of a rider for both the inner ring and the outer ring of horses. To do this, first measure the time it takes for one revolution, T. Then use the following equations to calculate v and a_c for each ring. T = _____ s

Inner Ring:

$v = 2 \cdot \pi \cdot r / T =$ _____ m/s $\quad a_c = v^2 / r =$ _____ m/s^2

Outer Ring:

$v = 2 \cdot \pi \cdot r / T =$ _____ m/s $\quad a_c = v^2 / r =$ _____ m/s^2

On the ride: Use the horizontal accelerometer to measure the centripetal acceleration at each position. Be sure the accelerometer is horizontal - you can hold it against the post you hold on to - and aim it toward the center of the circle. Remember: The tangent of the angle gives the number of g's of acceleration.

a_c for the inner ring = _____ g's $\cdot$ 9.8 m/s^2 = _____ m/s^2

a_c for the outer ring = _____ g's $\cdot$ 9.8 m/s^2 = _____ m/s^2

Observations/Conclusions: Where did your measurements show the greatest acceleration?

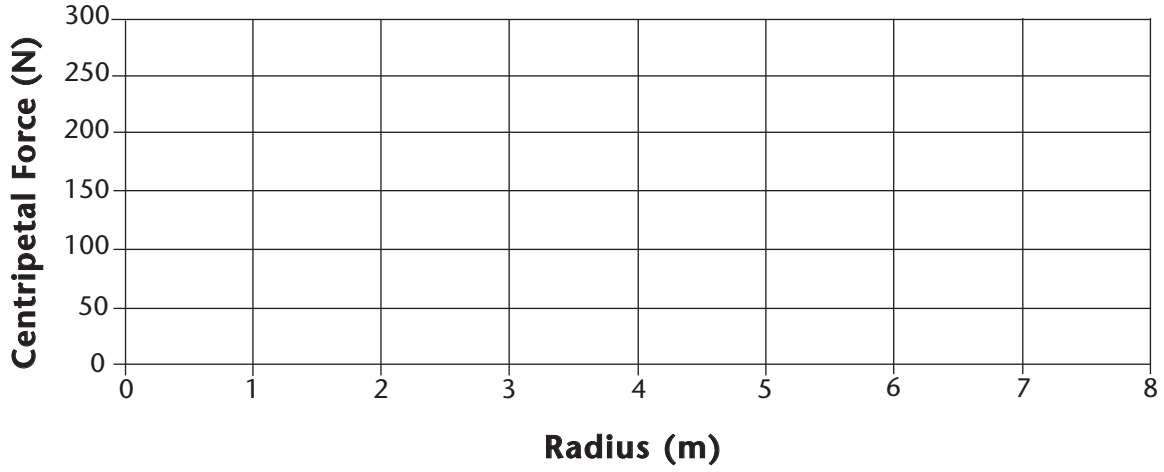
_____

_____

(over)

Graph It !!: As you ride further out from the center of the CARROUSEL, the centripetal force, F_C, changes. Sketch the graph that shows how the centripetal force varies with the distance from the center of the ride, r.

CENTRIPETAL FORCE ON THE CARROUSEL



Engineering Specifications:

Inner Radius = 5.3 meters
Outer Radius = 7.2 meters

$\pi = 3.14$