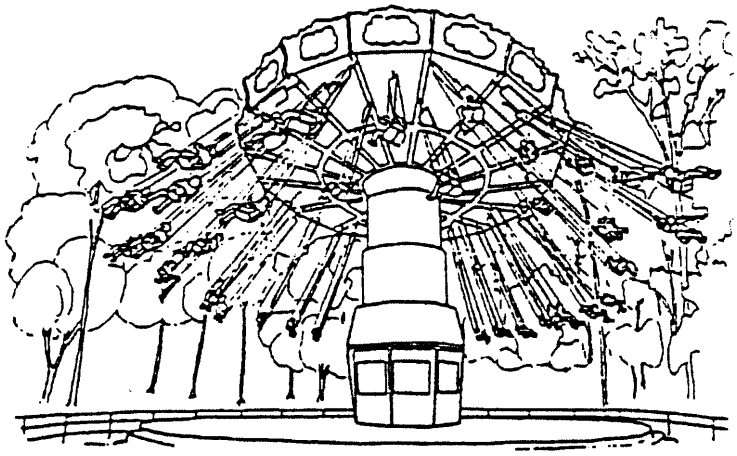
Name: Partner: Teacher:

Riverview Racer

QUALITATIVE QUESTIONS



1. Will an empty swing or one with someone in it ride higher? Why? (If there is no empty swing, compare one with a large person to one with a small person.)

2. Watch the ride from the beginning until it reaches full speed but before it tilts. What happens to the angle of the chain attached to the seats as the ride increases in speed? Why?

3. Describe how your apparent weight changes as the ride increases in speed. Explain!

4. Describe how your sense of up and down changes as the ride increases in speed. Explain!

QUALITATIVE QUESTIONS (continued)

5. Close your eyes and point to the direction that seems to be down. While riding Riverview Racer, open your eyes and compare "apparent down" to "actual down."

6. As you are riding the swings, does your body lean in or out? Why?

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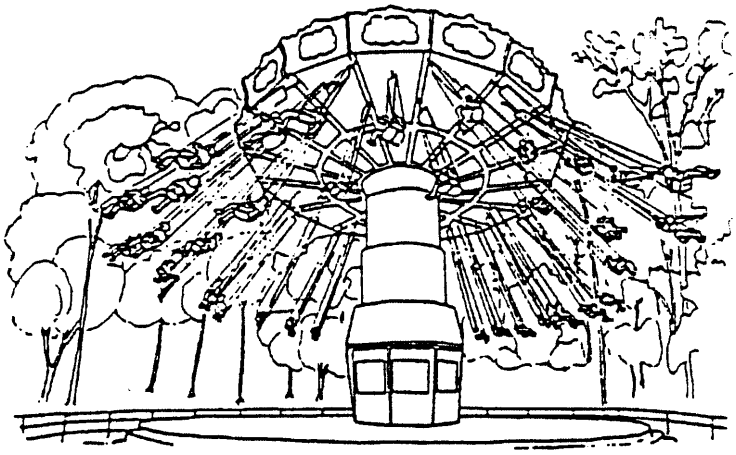
QUANTITATIVE QUESTIONS

Note: Once the ride is up to full speed, the plane of the circle of seats normally tilts. For Physics Day, the tilting will be disabled to make measurements and analysis easier.



1. What is the maximum radius of the circle formed by the swings as the ride is moving?
   (Find the circumference of the circle by walking around the ride and counting your paces before you get on.)

2. What is the period of rotation when the ride reaches its maximum radius?

3. What is the tangential velocity of the riders when the ride reaches its maximum radius?

4. Using the values from #1 and #3, calculate the centripetal acceleration of the riders.

5. Draw a free body diagram that shows all of the forces that act on the rider:
   a. When the ride is at rest
   b. When the rider is moving.

6. What is your maximum Force Factor reading before the ride tilts in each of the following orientations on the ride?
   a. vertically (i.e. perpendicular to the ground) _____
   b. horizontally (i.e. parallel to the ground and directed toward the axis of rotation.) _____
   c. tilted parallel to the chains _____

QUANTITATIVE QUESTIONS (continued)

7. a. Which orientation of the Force Factor meter in #6 is directly related to the centripetal force on the rider? Explain

   b. Use this Force Factor meter reading to calculate the centripetal force on a 100 kg rider.

8. Use the values from questions 1 and 3 to calculate the net force (centripetal force) acting on the swing/rider combination if the combined mass is 100 kg.

9. Calculate the weight of the swing/rider combination.

10. Using your free body diagram and your answers for weight and net force (centripetal force), determine the angle relative to the vertical that the rider should swing.

11. While observing the ride from the side, measure the angle relative to the vertical that the riders swing. Compare your measured angle to your calculated angle.

12. Using the measured angle and your free body diagram, determine the net force (centripetal force) on the rider. How does this answer compare to your answer to question 8?