Name: Partner: Teacher:

**Rush Street Flyer**

## QUALITATIVE QUESTIONS

**NOTE: Answer these questions based on what you see when you are looking at the ride from the front and the ride is moving at full speed in a clockwise direction.**

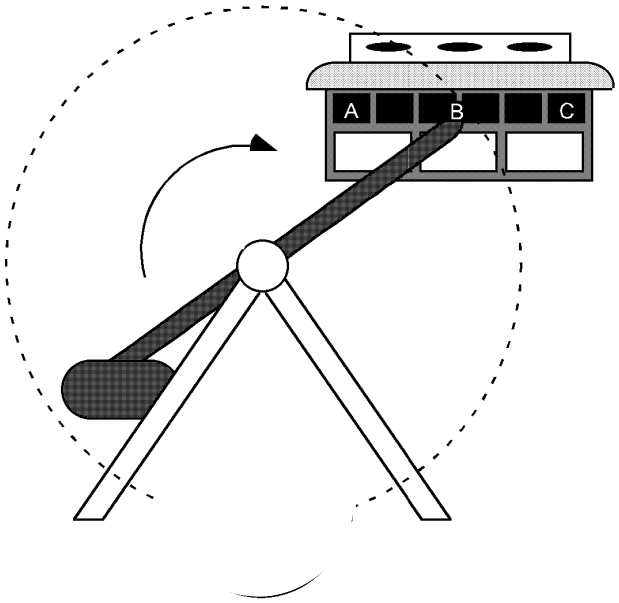
1. Is the car level at all times or does it tilt as it goes around?

2. Draw a rectangle representing the car at the top, bottom, left side, and right side positions on the diagram.

3. Label each rectangle for passengers A, B, and C on the diagram.

4. The dotted line represents the path followed by a person sitting in position B in one revolution. Draw the path for passengers A and C on the diagram.

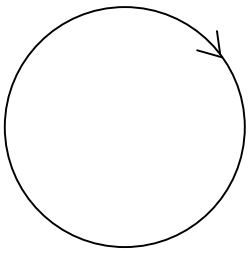
5. For a person sitting where you sat, is the path a perfect circle? Justify your answer based on your drawing.




6. Once the ride reaches full speed, does the ride appear to vary in speed or maintain a fairly constant speed?

7. On the circle representing a rider's path, indicate at what point you felt
   a. heaviest. b. lightest.

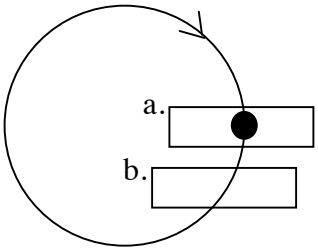
   c. Explain why you feel heavier at one position more than at any other.



   d. Explain why you felt lighter at one position more than at any other.

## QUALITATIVE QUESTIONS (continued)

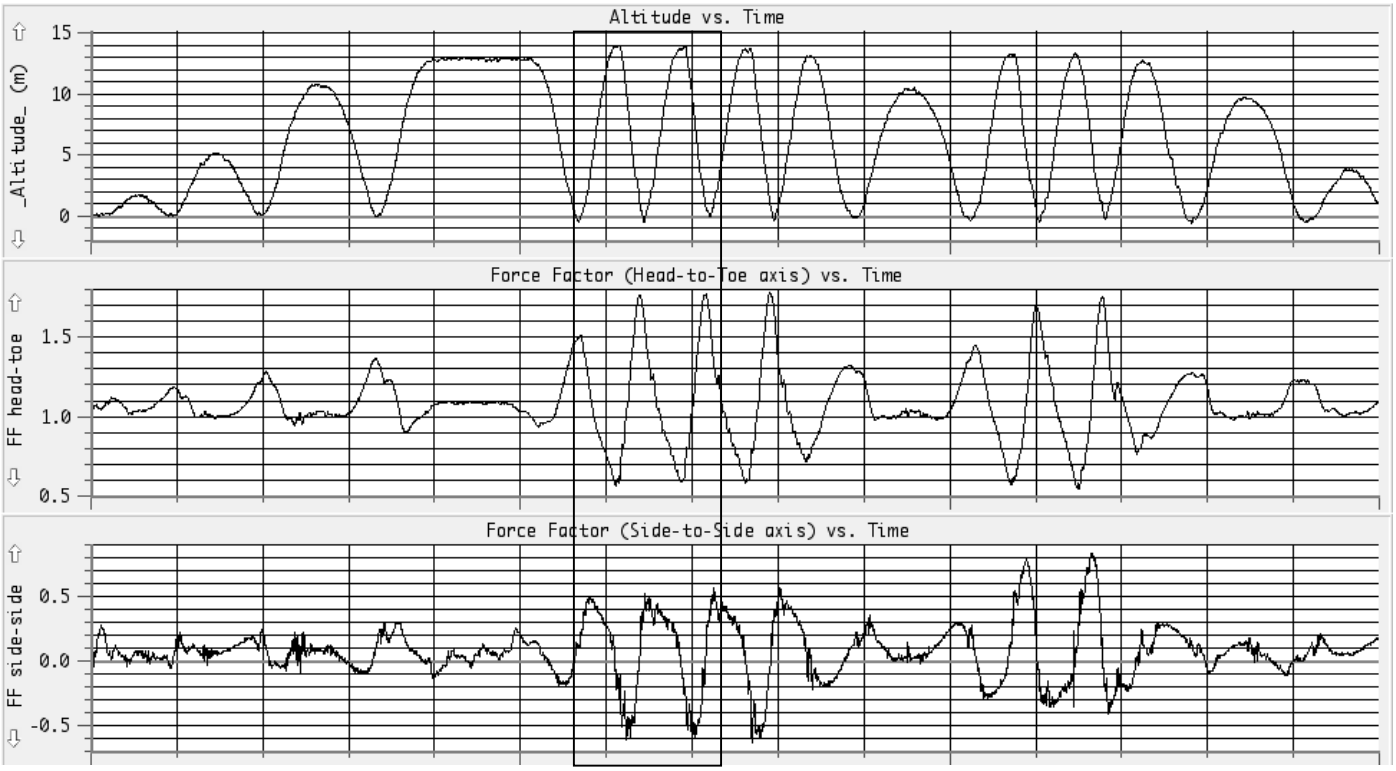
8. a. As the ride spins from point a. to point b., does a rider tend to slide to the inside or to the outside of the circle?



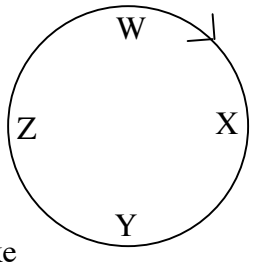

b. Is something pushing the rider in the direction you chose? If yes, what?

c. If the rider isn't actually pushed, why does the rider tend to slide? As part of your explanation, draw a dotted line to indicate the path the rider would follow if the seat were suddenly slippery and had no restraints and explain its significance in your answer.

*The questions on the next page refer to the boxed portion of the Force Factor and altitude graphs.*

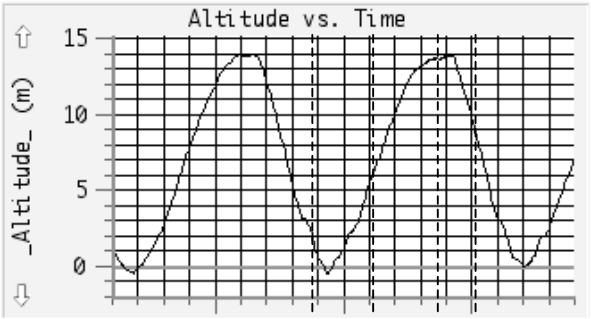


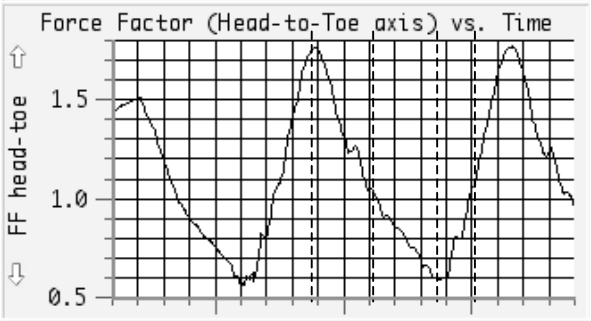
## QUALITATIVE/QUANTITATIVE QUESTIONS

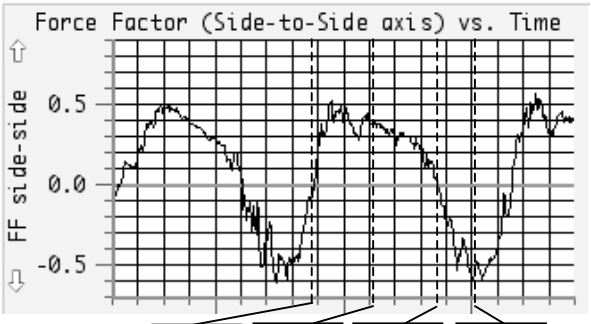



The following graphs are enlargements of the highlighted sections of the graphs on the previous page.

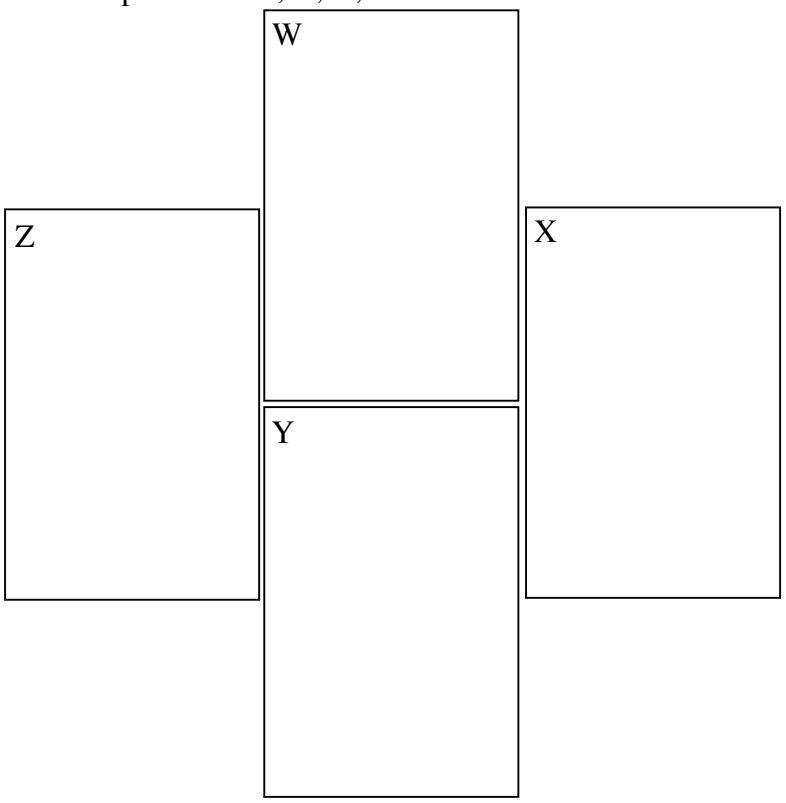
9. Label positions W, X, Y, and Z in the boxes at the bottom of the graphs.



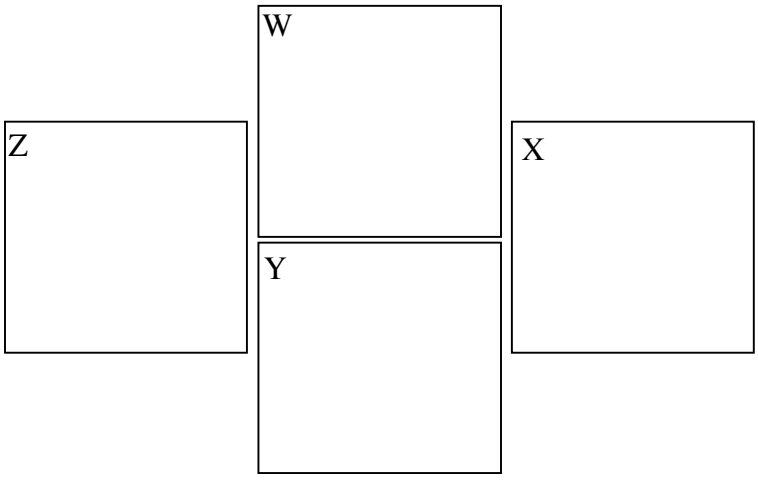




10. Use the Force Factor graphs to make quantitative free-body diagrams for a 70 kg rider at positions W, X, Y, and Z.




11. Draw vectors representing the net force on the rider at positions W, X, Y, and Z with a solid line and the acceleration of the rider with a dotted line.



## QUANTITATIVE QUESTIONS (continued)

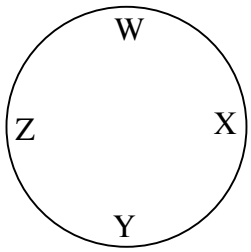
**NOTE: Answer these questions based on what you see when you are looking at the ride from the front and the ride is moving at full speed in a clockwise direction.**

1. Measure the period of rotation of the ride at full speed.

2. What is the radius of the ride?

3. Calculate the average tangential speed of rider.

4. Calculate the average centripetal acceleration of a rider.




5 a. Use circular motion principles to calculate the net force on a 60.0 kg rider at **point W**.

b. Draw a free-body diagram and use Newton's 2nd Law to calculate the normal force on a 60.0 kg rider at point W.

c. Calculate Force Factor for the rider at point W.

d. What is the value for the head-to-toe Force Factor on the graph at point W?

e. Propose an explanation for any differences between the Force Factor that you calculated and the Force Factor from your graph at point W.

## QUANTITATIVE QUESTIONS (continued)

6 a. Use circular motion principles to calculate the net force on a 60.0 kg rider at **point Y**.

b. Draw a free-body diagram and use Newton's 2nd Law to calculate the normal force on a 60.0 kg rider at point Y.

c. Calculate Force Factor for the rider at point Y.

d. What is the value for Force Factor on the graph at point Y.

e. Propose an explanation for any differences between the Force Factor that you calculated and the Force Factor from your graph at point Y.

7 a. Use circular motion principles to calculate the net force on a 60.0 kg rider at **point Z**.

b. Draw a free-body diagram and use Newton's 2nd Law to calculate the side-to-side normal force on a 60.0 kg rider at point Z.

c. Calculate Force Factor for the rider at point Z.

d. What is the value for Force Factor on the graph at point Z.

e. Propose an explanation for any differences between the Force Factor that you calculated and the Force Factor from your graph at point Z.