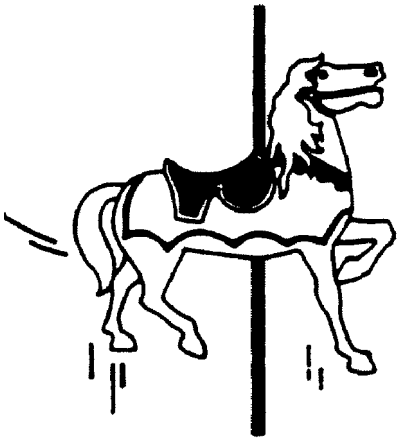
Name:	Partner:	Teacher:

Grand Ole Carousel



QUALITATIVE QUESTIONS

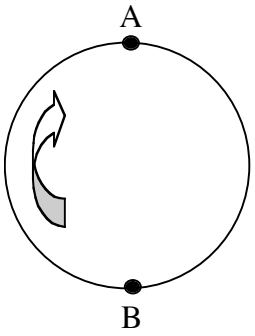
For the following questions, consider a horse that moves up and down.

1. Which horses, those on the inside or those on the outside, have the greatest tangential speed? Explain.

2. How does the angular speed of an outer horse compare to that of an inner horse?

3. While the ride is revolving at a constant angular speed, place a foam ball on the carousel. Describe the path that it takes.

4. If you were to throw a ball from position A on the diagram to someone at position B while the ride was turning, where would you aim the ball?



5. Draw the path of the ball as seen by someone hovering above the ride.

6. Draw the path of the ball as seen by a person on the ride at point B

7. What types of acceleration do people riding on the carousel experience?

8. Record the vertical Force Factor reading when ascending and descending.

QUALITATIVE QUESTIONS (continued)

9. Record the horizontal Force Factor reading as directed along the radius of the ride. Is this directed inward or outward?

10. Notice the foam balls hanging from the ride. Do the foam balls all hang at the same angle when the ride reaches a constant speed? Explain.

11. How does the centripetal acceleration depend on the distance from the center of the carousel? How is your answer supported by your observations from the previous question?

12. Imagine that once the carousel was turning, the motor was suddenly turned off and the carousel continues to turn freely with no frictional loss. If the riders moved from the inside horses to empty outside horses, what effect would this have on the motion of the carousel? Explain.

13. Consider your <u>two</u> motions (relative to the ground) while riding the carousel. At what point is your resultant speed the greatest?

14. From the frame of reference of the axis of rotation of the carousel, describe the shape of the path of the horse's motion as the platform turns.

QUALITATIVE QUESTIONS (continued)

15. From the point of view of someone watching the ride from outside of the ride, determine the shape of the horse's path as viewed:
    a. from above the ride

    b. from the side

16. Considering vertical motion only, at which points is:
    a. the velocity the greatest?

    b. the acceleration the greatest?

    c. the velocity the least?

    d. the acceleration the least?

17. Which of the following types of motion occur on this ride? Where do they occur?
    a. uniform linear motion

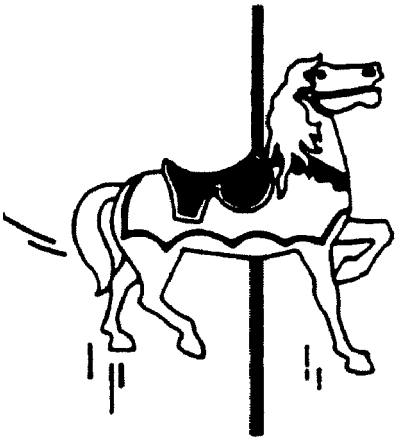
    b. uniformly accelerated motion

    c. uniform circular motion

    d. simple harmonic motion

Grand Ole Carousel

QUANTITATIVE QUESTIONS



NOTE: For the following questions, consider a horse that moves up and down.

1. Determine the time for:
   a. One revolution of the carousel

   b. One complete up and down cycle of a horse

2. Determine the circumference of:
   a. the outer ring of horses.

   b. the inner ring of horses.

3. Calculate the tangential speed of the outer ring of horses and compare this to the tangential speed of the inner ring of horses. Explain the difference in speeds if the carousel continues to travel at the same angular velocity.

4. Calculate the centripetal accelerations, using your answers to #1-#3, for the outer horse and for the inner horses.

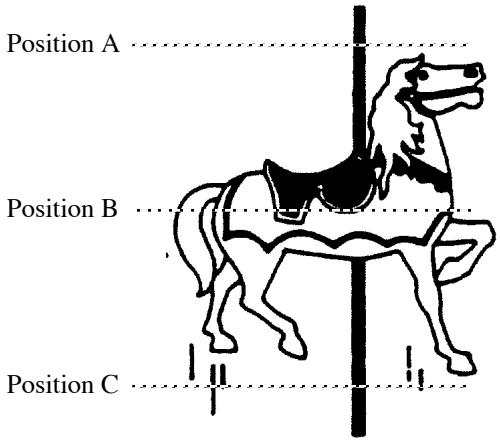
5. Calculate the centripetal accelerations for the outer horses and inner horses using the readings from your Force Factor meter.

QUANTITATIVE QUESTIONS (continued)

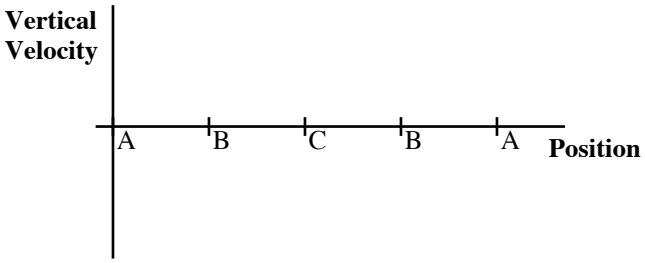
6. Compare your calculated values for the centripetal accelerations from #4 to your values from #5 for both rings of horses.

8. By how much does your potential energy change as the horse goes up and down? Assume your mass to be 60.0 kg.

9. Consider the diagram of the horse to the right. Assume that position A is the highest position of the horse, position B is the midpoint of the horse's motion and that position C is the lowest position of the horse.



   a. Sketch a graph of vertical velocity as a function of position on the set of axes below:



   b. Sketch a graph of vertical acceleration as a function of position on the set of axes below: