Experiment #1

77077

Slowing Down the Swing Ride

Objectives: Make and test predictions about how mass affects the speed of a ride

Materials You Will Need:

- built **SWING RIDE** model
- 16 washers, paperclips or other small items of equal mass that can be weighed and taped to the seats
- stopwatch
- masking tape
- ruler or measuring tape
- pen or pencil
- regular paper or journal
- graph paper

PROCESS:

1. Build the **SWING RIDE** model by following the step-by-step building instructions.

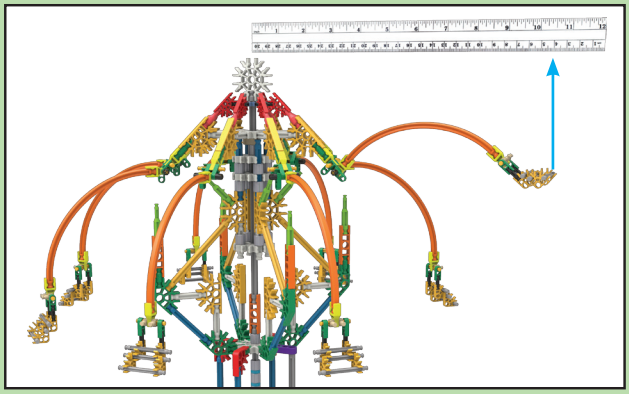
2. First, you should:

   a. Determine the circular **distance** traveled by one of the seats during one revolution. Remember that the formula for circumference is:

$$C = 2\pi r$$

Tip:

The easiest way to do this is to hold one of the seats out parallel to the ground and measure the distance from the seat to the center of the top white connector. This measurement will give you the radius or "r".



b. Determine the **time** it takes for the ride to complete five revolutions. Remember, complete multiple trials and average the results to arrive at your value for time.

Tip: Put a piece of masking tape on one of the seats so it will be easier for you to identify full rotations.

c. Determine the time it takes for 10 revolutions, 15 revolutions and 20 revolutions.

d. Calculate the speed/velocity of the ride:

$$v = \frac{d}{t}$$

Where: **d =** 5 times the circumference of the path the seats take during a revolution

t = the time for 5 revolutions of the ride

e. Complete the chart below: (Remember, the numbers in the distance column increase by 5 times the circumference as you move from 5 revolutions to 10 to 15, etc.)

Number of Revolutions	Time (sec)	Distance (m)	Speed (m/sec)
5			
10			
15			
20			

3. Repeat steps 2b through 2e with the addition of:

a. One 'rider' (washer, paperclip or other small item) taped to each seat

Number of Revolutions	Time (sec)	Distance (m)	Speed (m/sec)
5			
10			
15			
20			

b. Two 'riders' taped to each seat

Number of Revolutions	Time (sec)	Distance (m)	Speed (m/sec)
5			
10			
15			
20			

4. Prepare a graph to show your speed/velocity data.

   a. X-axis – List 'Empty Car', 'One Seat Filled', and 'Two Seats Filled'

   b. Y-axis – Velocity/speed of the ride

5. Draw conclusions about what happens to the speed of the ride as more mass is added.

   a. How fast did the ride move when it was empty? With one rider per seat? With two riders per seat?

   b. What information did your chart provide?

   c. Describe any trend that you notice as you read your data.

   d. Describe how your graph demonstrates the reaction of the ride's speed to the added mass.