# Introduction to Circular Motion

## Activity #1: Making the Turn

* Use a tennis ball and a dry erase board.
* Balance the tennis ball on the board.
* Walk in a straight line for 5 steps then make a left hand turn.

Describe what happens to the ball:

## Activity #2: Loop the Loop

* Fill an ice cream pail ¼ full of water.
* Slowly start it moving back and forth holding it by one hand.
* Rotate the ice cream pail in large vertical circles WITHOUT spilling any water.

Describe the relative tension force (supplied by your arm) on the bucket when it is at the top and at the bottom of the loop through which it moves:

## Activity #3: Newton’s 2nd Law for Circles

**a** Gradually increase the track's speed of rotation until the truck *just* reaches the stop at the end of the track. Time 10 revolutions of the turntable and calculate the time for one revolution.

**b** Measure the radius of the circle described by the rotating truck, *R*, and calculate the speed of the truck in its orbit, *v*.

**c** With the turntable at rest, use a force meter to measure the force, *F*, required to extend the spring by the same amount as it does when the truck hits the end stop.

**d** Compare this actual force with the theoretical value of the centripetal force, *mv²/R*. (You calculated v and measured R in step b.) The mass of the cart is 500 g.

## Activity #4: Moving Bubble

* Put a level on a stool with a rotating seat (position it so that it is NOT in the exact center).
* Spin the seat.

Which way does the bubble move? Why do you think this is so?

## Activity #5: Slay the Giant

* Get a rubber stopper attached to a string.
* Go into the hallway and find a “Giant” attached to the wall.
* Spin the stopper in a horizontal circle above your head.
* Let go. Repeat until you hit the Giant.

Draw an arrow showing the correct release point required to hit the Giant.

What direction is the velocity in the picture above?

## Activity #6: Euler’s Disk

* Hold the disk upright but slightly angled onto its rolling edge.
* Give it a twist and let go.

How does this demonstrate Newton’s First Law of Motion – the law of Inertia?

What causes the disk to eventually stop spinning?

## Activity #7: I’m Going In a Straight Line?

* Stack the two half cups with the one with the lip cutout on the inside.
* Put the marble in the middle and swirl the marble inside.
* Once marble is going fast, lift the OUTER ring only.

Describe how the marble behaves both before and after lifting the outer ring.

## Activity #8: Ball Race

* On the platform, start a volleyball and bowling ball at the same point at the top of ramp.
* Release them both at the same time. Which one wins?

Why do you think that ball won? Which law of motion best describes what happened?

* Use a container with a chunk of hair glued to the bottom.
* Fill it with water so that it covers the hair.
* Carefully spin the container on a spinning stool.

Which way does the hair bend? Why do you think this is so?

