# Student Guide

## Motion in a Circle

### Lesson Objectives

* Explain the forces at work that will cause an object to move in a circle.
* Predict how the motion of an object will change if the force applied to the object is more or less, or the speed of the object is faster or slower, or both.
* State that if the force holding an object in a circular motion suddenly falls to zero, the object will continue to move in a straight line with the same energy.

### PREPARE

Approximate lesson time is 60 minutes.

#### Materials

For the Student

Setting It Straight

marble

paper - strip (3 cm by 20 cm)

pencil

plate, paper - smooth with raised lip

scissors, round-end safety

tape - masking

The Spin Is In

washers (3)

spring scale

string - 30 cm

#### Keywords and Pronunciation

**acceleration:** Any change in velocity. An airplane taking off and a person riding a carousel horse moving at constant speed are both experiencing acceleration.

**centrifugal** (sen-TRIH-fyuh-guhl)

**centrifuge** (SEN-trih-fyooj)

**centripetal** force (sen-TRIH-puh-tl) : A force directed at the center of a circle, which pulls or pushes objects toward the center. When you swing a ball on a string in a circle, a centripetal force is acting on the ball.

**inertia** (ih-NUHR-shuh)

**velocity** (veh-LAH-suh-tee): A description of an object's speed and direction. Either a change in speed or a change in direction will cause in a change in velocity.

### LEARN

#### Activity 1: Round and Round We Go (Online)

When an object moves in a circle, the forces involved are a bit more complicated than those that keep an object moving in a straight line. If you don’t think so, imagine yourself in a roller-coaster car going around a curve. You slide to the side of the car. What is going on? Read the online lesson.

#### Activity 2: Setting it Straight (Offline)

Does an object moving in a circle really tend to move in a straight line when there's no longer any centripetal force? This is hard to believe. The best way to find out is to test it. Use a marble, paper plate, and a target to set this idea straight in your mind. Follow the directions in the Setting it Straight activity sheet.

#### Activity 3: The “Spin” Is In on Centripetal Force (Offline)

Does all this talk of forces have your head spinning? Investigate the force involved in spinning an object in a circle. You'll understand the forces behind looping roller coasters, space satellites, and our spinning Earth. Follow the directions in The Spin is In activity sheet.

**Safety**

Perform this activity in a wide, open space. Keep other people away while you perform this activity.

### ASSESS

There is no online assessment for this lesson.