

## Physics

# Anti-Gravity Gyros

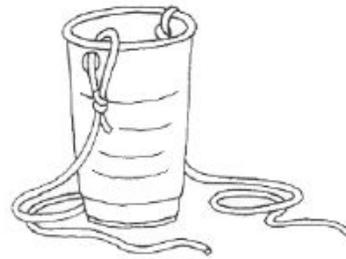
Target grade level(s): 1st-7th grade

Explore ways to overcome gravity by building and testing an anti-gravity device. Earth's gravity is what keeps us on the ground and what causes objects to fall. Inertia, or Newton's First Law of Motion, states that objects at rest tend to stay at rest and objects in motion tend to stay in motion (unless acted on by an outside force). Centripetal forces are any forces (gravitational, electrical/atomic, or tension) that move inward, toward the fixed center of the circular motion. In this activity, the string attached to the cup creates a centripetal force and when the circular motion of the cup moves faster than the horizontal motion (inertia) of the water/objects. As a result, the water/objects stay in the cup.



### Supplies

- 9oz paper cup
- One (1) sharpened pencil
- One to five (1-5) pennies or marbles
- Water
- Two (2) 2ft long pieces of string
- One (1) roll of tape



### How-to DIY:

1. Using the pencil, punch one hole in the cup  $\frac{1}{2}$  inch below the rim
2. Punch a second hole on the opposite side of the cup  $\frac{1}{2}$  inch below the rim
3. Thread one piece of string through each hole and tie them off
4. Place pennies in the cup
5. Investigate how you can prevent the materials from falling out of the cup when upside down
6. Repeat steps 4-5 with pennies and marbles



### Challenge

### Guiding Questions:

1. What direction does gravity point?
2. What is inertia?
3. What things resist the force of gravity by moving in the opposite direction?
4. How can you prevent gravity from making the water spill out of the cup when it is turned upside down without placing your hand over the top of the cup?
5. When you tested your anti-gravity device, what is it that prevented the penny, marble, or water from spilling out?

