

# Speedy Spinners

Try this experiment to learn how ice skaters speed up and slow down their spins with ease

## Collect

- Sturdy plastic drinking straw
- String
- Scissors
- 2 metal washers, one larger than the other (1 1/2" diameter and 3/4" diameter work well)
- Stickers (optional)

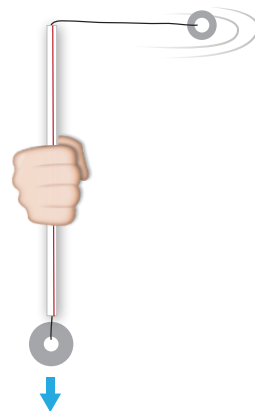


## Make your spinner

1. Cut a piece of string so that it is about 8" longer than the straw.
2. Thread the string through the straw.
3. Tie the larger washer on one end of the string, and the smaller washer on the other end of the string.
4. If you'd like, cover the holes on either side of the washers with stickers.

## Give it a spin!

5. Hold the straw vertically with the smaller washer on top.
6. Reach your arm out and make rapid circles with your wrist to get the smaller washer to start spinning around the straw. Keep spinning at a consistent speed until the larger washer is touching the bottom of the straw.
7. Continue spinning, and with your other hand, slowly pull down on the larger washer.
8. Observe what happens to the spin of the smaller washer.



## What's happening?

All spinning objects have angular momentum. Angular momentum depends on two things: velocity and moment of inertia. The velocity of a spinning object is how fast the object moves in a circular motion. The moment of inertia describes the object's mass; where it's located and how it's distributed. Velocity and angular momentum always affect each other. If you alter the length of the string, you change the moment of inertia, which then changes how fast the object spins. When you pulled down on the larger washer, the string shortened and the smaller washer started spinning faster. When an object's mass is closer to the point of rotation, it has a smaller moment of inertia which means the object spins faster.

## What's the ice skating connection?

When an ice skater spins, you might notice that they change the shape of their body depending on how fast they want to spin. To spin slowly, a skater spreads out their arms and sometimes a leg to increase the moment of inertia. When an ice skater wants to spin faster and become a blur on ice, they tuck their arms close to their body, which decreases the moment of inertia and causes the athlete to rotate faster.

## Take it further!

You can also demonstrate this by sitting in a spinning chair. Ask someone to spin you on a carpeted surface while you hold your arms straight out to the side. Pull your arms in to your body and notice what happens to your spin!

