



## Wheel and Axle Cup Racer

### Getting Ready

This is a race with your fingertips working like a “motor”. Which paper cup “bucket” do you think is the fastest? *Is this really “twisted” science???*

### Stuff to Make it Happen (Materials)

2 paper cups*	empty spool	straw	hole punch*
scissors*	adhesive tape*	string	

### Making it Happen

1. Punch two holes in a paper cup’s rim directly opposite of each other. Do the same thing to the other cup. *Check out the drawing for help as you follow the directions.*
2. Cut 2 identical string pieces, each about 3 feet long. Thread one string end through the two cup holes. Tie this end back onto the string. Do the same thing to the other cup. You should have two cups which look like little buckets with very long string handles!
3. Slide the spool about a third of the way down the soda straw. *Tape the spool in place if the straw doesn’t hold it tightly.*
4. Tape the string’s loose end on one paper cup “bucket” to the spool.
5. Tape the other string’s loose end directly on the straw. *See the diagram.* *Be sure the paper cup “buckets” are the same distance below the straw.* If they’re not, adjust the string. This must be a “fair” race!
6. If you were to start turning the straw, which bucket would get to the top first? Make your predictions. It’s almost race time! Racers, to your starting marks!!
7. Grab the two ends of the straw with fingers using both hands. Let’s find out! Look how much faster the spool “bucket” moved!!!

### Understanding the Science

A **Machine** makes **Work** easier. (Work is using some kind of **Force** to move an object some **Distance**.) This machine is called a **Wheel and Axle**. The straw is the axle, the spool is the wheel. When you put a force in the straw by turning it, the buckets move! Both strings were on the same straw, yet they moved differently. Each time the straw turned one time there was a larger amount of string wrapped up by the spool. That’s why it won! The invention of the wheel and axle changed history. Think of the devices which use a wheel and axle to make a force move something. Observe this machine changes your force’s direction as well, doesn’t it? You twisted the straw to make the “buckets” move straight up.

### Let’s Check the View!

#### (Questions and Assessments)

1. Would a wider spool move the “bucket” up faster or slower? Why do you think so?

