Curiosity Guide #301
Wheel and Axle

Accompanies Curious Crew, Season 3, Episode 1 (#301)

Funnel Races

Investigation #2

Description

Learn more about how a wheel and axle work together.

Materials

- 2 similar funnels
- String
- Scissors
- Measuring tape
- Cellophane tape
- Pan of flour

Procedure

1) Measure and cut one meter of string.
2) Tape one end of the string to a funnel on the thinner part, just under the wide part of the funnel.
3) Repeat with the second funnel.
4) Lay one funnel with its wide end down. The string should trail out to the side.
5) Hold the second funnel so that the small end is on the table. Its string also trails out to one side.
6) Challenge two people to see who can wind up the string faster.
7) One person will wind using the small end of one funnel. The other person will turn the large end of the second funnel.
8) Who can wind up the string faster? Why?

My Results

Explanation

In this example, the wide part of the funnel is the wheel, and the small part is the axle. Although each person is winding a similar length of string, the person spinning the axle can do the job more quickly. Because the spinning axle is making a smaller rotation than the funnel turned from the wide end, the axle is rotating a smaller distance and can do it faster. The trade-off is that the person rotating the axle needs to apply more effort for the same rotation.

Investigate further: You can show the distance that both ends must travel by making funnel tracks in the flour. Place one end of the funnel in a pan of flour and rotate the funnel one time around. Try the same thing with the other end of the funnel. Compare the lengths. What did you notice? Clearly the wide end of the funnel--the wheel--must travel

much further. When the thin end of the funnel--the axle-- turns, it functions as a speed multiplier.

Do some research: Use the internet to locate photos of a potter's wheel, a solid wood wheel, spoke wheels, and modern wheels.

We believe that the first invented wheel happened 6000 years ago, around 4000 BC, in what is now Iraq. The first wheels were pottery wheels. Pottery wheels were used to speed up the process of making pottery. Several hundred years later, people in Central Asia discovered that by attaching a fixed axle with a smaller radius to the wheel, the solid wood wheel could provide a mechanical advantage when moving things. Wheel designs sure have changed, but their benefits keep on rolling!

Parents and Educators: use #CuriousCrew #CuriosityGuide to share what your Curious Crew learned!

Curious Crew is a production of Michigan State University.
Learn more at WKAR.org.