



Curiosity Guide #301

Wheel and Axle

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

Axle Adult

Investigation #4

Description

Find out how to turn an adult around with little effort. All it takes is a simple machine!

Materials

- Plastic sheet, old shower curtain, or piece of cardboard
- Scissors
- Long wooden 2 by 4, about 8 feet long
- Short wooden 2 by 4, about 2 feet long
- Adult
- Sleeve for the wood, worn like a harness on the chest, to receive the 2 by 4 boards

Procedure

- 1) Cut a heavy piece of plastic or cardboard into a 2-by-2-foot square.
- 2) Lay the plastic or cardboard piece on the floor.
- 3) Have an adult sit on the plastic.
- 4) Hand the adult a short 2 by 4 length of wood. The adult should hold the piece of wood securely across the chest.
- 5) Try pushing against the other end of the board. Can you rotate the adult on the floor?
- 6) Switch to the larger length of 2 by 4. Try the experiment again.
- 7) Can you rotate the adult now?

My Results

Explanation

A lever is a simple machine that uses a rigid arm or beam and a pivot point to lift or move heavier objects. A load is positioned somewhere on the length of the beam. Effort is applied to another part of the beam, and the load moves.

A wheel and axle is a kind of lever. It works in the same way as a first-class lever. The fulcrum is the axle to which the wheel applies a force. In many cases, the wheel can rotate a full 360 degrees. In this case, the end of the board will travel in a circle. The board itself is part of the wheel, kind of like a spoke in the wheel, while the person acts as the axle in that wheel. The further away you apply the force from the center, the more leverage you have. If the spoke is really long, you can rotate very heavy things. Turning the rim of a wheel is a force multiplier.

Something else to do: Find pictures of simple wheel and axle machines. Look for doorknobs, pizza cutters, electric fans, screwdrivers, a socket wrench, bicycles, and cars. Can you identify the wheel and the axle in each of these tools?

Wheels and axles are all around us. They can make jobs much easier, not to mention more fun. You saw how the crew could rotate an axle, but did you know that all around the world, people use animals to turn a drive wheel for different kinds of mills or water pumps? You can even "see" the shape of the wheel from the animal's tracks in the ground. The animal gets some good exercise and does work at the same time.



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