Get Your Gears Here

Purpose
To understand how gears work

Procedure

1. Choose several different sized jar lids and measure the circumference of each. Record in your science journal.
2. Cut strips of corrugated cardboard 1.5 cm wide by the length (determined by the circumference) for each lid.
3. Count the number of "teeth" (ridges in the cardboard) for each strip. If there are an odd number of teeth, cut one tooth off to make it an even number.
4. Carefully stretch the cardboard so that the teeth are facing outward and are evenly spaced around the edge of the lid. Glue into place. See diagram 1.
5. Glue a small wooden dowel to the edge of each gear. See diagram 2.
6. Once the glue is dry, use a compass to find the center of the lid.
7. Use a small nail and hammer to make a hole in the center of the lid.
8. Using the push pins, pin the gears to the foam board so that the teeth of each gear mesh with the teeth of another gear. The gears should spin freely and be arranged in order from smallest to largest.
9. Use a marker to mark a starting point for each gear. Line the dowel up with the marker. See diagram 3.
10. Experiment with turning the gears and observe what happens.
11. Record your observations in your science journal and answer the conclusion questions.

Conclusion

1. When you turned the largest gear, what happened to the two smaller gears?
2. Which way did they turn?
3. Which gear did a complete turn first?
4. When you turned the smallest gear, did the largest gear turn more quickly or more slowly?
5. Turn the smallest gear one complete turn and count the number of teeth that pass the starting point for the middle gear and for the largest gear. What can you conclude from this comparison?

Extensions

1. Find objects such as a hand-powered eggbeater, bicycle, clock, and so on that use gears. Observe how they work.
2. Count the teeth in both sprocket wheels of a bike. Predict how many turns the rear wheel will make for every turn of the pedals. What would happen if a smaller sprocket were used on the rear wheel?
3. Tie a ribbon around a spoke of a bike's rear wheel. Predict how many turns the wheel will make as the pedals go around once. Turn the bike upside down and turn the pedal once.

Materials

corrugated cardboard
jar lids of different sizes
push pins
foam board (15 cm X 30 cm)
2-3 cm dowel pegs
glue
metric measuring tape
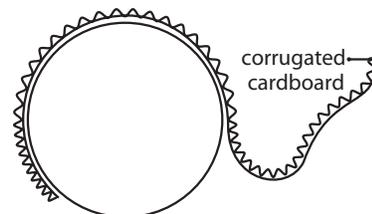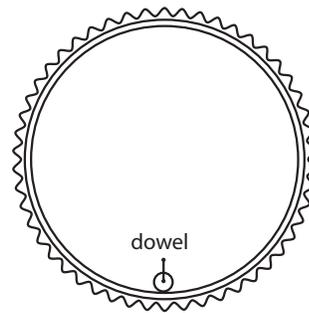small nail
hammer
marker
science journal

corrugated cardboard
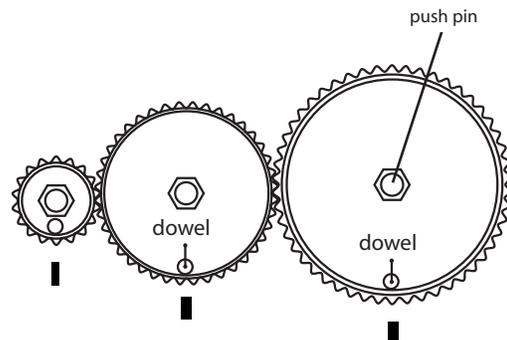
Diagram 1

dowel

Diagram 2

push pin
dowel
dowel

Diagram 3