

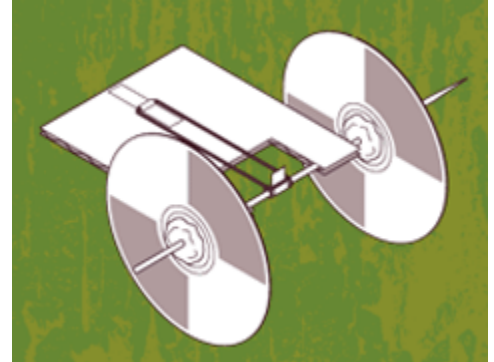
Accelerating Rubber Band Car

THE CHALLENGE

Build a car that goes really far, really fast. Oh, by the way, your power source is a rubber band.

MATERIALS (PER CAR)

- 5 x 6—inch piece of corrugated cardboard
- Ruler
- Scissors
- 1 wooden dowel (These probably will be 1/8 of an inch thick.)
- Tape (masking or duct)
- washers (Size: 1/4—inch Large)
- CDs
- Hot glue gun
- 1 rubber band
- Pencils, pens, or markers



BUILD

1. **Notch the body**~Cut a notch in the center of the five—inch side of the cardboard. Make the notch 2 inches wide and 1 1/2—inches deep. Throw away the piece you've cut out.
2. **Make the axle**~Slide the dowel through the cardboard, close to the outer edge. Make sure the axle sticks out the same amount from each side of the body. Make sure the dowel rotates freely.
3. **Modify the axle**~Find where the dowel goes across the notch. In the middle of this section, wrap a small piece of tape to make a "catch" for the rubber band. Try twisting the tape that is sticking up to make sure the catch is thick enough to hold the rubber band.
4. **Assemble the wheels**~Hold a washer in the center hole of a CD. Slide the washer and CD onto the axle, leaving lots of room between the CD and cardboard. Put hot glue on the outside of the washer to join the CD, washer, and axle tightly together—REALLY TIGHTLY. The wheel and axle should now rotate together. Make the second wheel the same way.
5. **Attach the rubber band**~Tape one end of a rubber band to the cardboard at the end opposite the axle.
6. **Power your car**~Wrap the unattached end of the rubber band over the catch. Turn the axle several times. You've given the rubber band **potential** (stored) energy. When it unwinds, this potential energy is transformed into **kinetic** (motion) energy, and the axle spins. The more you wind the rubber band, the more energy is available for your car's wheels—and the farther and faster your car goes.

TEST

Set your car on the floor, rubber band side down. What happens when you let your car go?

REDESIGN

You've just built a **prototype**, which is an early version of a product. Prototypes help engineers understand a product's strengths and weaknesses and how it might be improved. Thinking about your car, try to come up with some ways to make it perform even better. You can also redesign it for new challenges, like making it work on sand or thick carpet. Brainstorm ideas, revise your design, and then build and test it.

DATA ANALYSIS

Collect time and distance data for your car and from that data make a distance versus time, velocity versus time, and an acceleration versus time graph.