



PLTW Engineering

**12/Design Challenge –
Rubber band Car**

April 28, 2020



12/EDD

Lesson: 4/28/2020

Objective/Learning Target: Students will be able to design a vehicle that transforms stored potential energy into kinetic energy.



Gather supplies needed

Find these or similar supplies to start the challenge:

- 1 square piece of corrugated cardboard (the kind with open tubes inside), about 5 1/2 inches square
- 2 CDs
- 1 wooden skewer (the thinner the better)
- 1 rubber band
- 2 pieces of Styrofoam, about 2 inches long and thick enough to fit tightly in the hole of a CD
- Tape
- Scissors
- Ruler



Step 1: Make the car body

You can try your own ideas but following these steps will result in a standard car you can tweak later to improve its performance.

Hold your cardboard so the corrugations (tubes) run side to side, not up and down.

Cutting across the corrugations, cut out a 2 inch-wide and 1 1/2 inch-deep rectangle, making a notch in the center of one side.

Throw away the piece you cut out.

Step 2: Make the Axle

Slide the skewer straight through one of the corrugations so it crosses the middle of the notch.

Make sure the axle sticks out the same amount on each side of the body.



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Step 3: Make the Wheels

Plug up the holes in the CDs with the pieces of Styrofoam. Make sure they stick out on each side of each CD by about half an inch.

Slide each wheel onto the axle, poking the end of the skewer into each piece of Styrofoam. Push the skewer straight through the hole of the CD, and out the other side.

Slide the wheel out so that the styrofoam doesn't rub on the cardboard.



Step 4: Create a catch

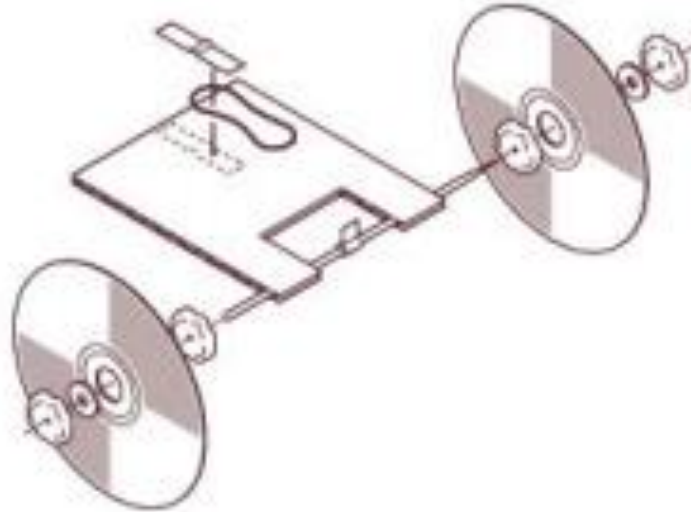
Find where the skewer goes across the notch.

In the middle of this section, wrap a small piece of tape to make a “catch” for the rubber band

Step 5: Attach the power source

Tape your rubber band to the end of the cardboard opposite the catch.

Here is an example of what the assembly should look like so far:





Step 6: Test your car

Wrap the unattached end of the rubber band over the catch.

Spin the axle a few times to wind it up around the axle.

Set your car on the floor.

Let go of the axle, and watch your car zoom away.



Questions to consider

1. What type of energy are you creating when you wind the rubber band around the axle?
2. What type of energy is being used when you let the car go?
3. What effects would making the wheels thicker have?
4. What effects would changing the diameter of the wheels have?
5. What effects does the floor surface have on the car?



Helpful links

[Science lecture explaining potential and kinetic energy](#)

[Kinetic and potential energy on an atomic level](#)