

Angeles City Science High School
Electronics 10

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Section: 10-Hawking

What I Can Do

Activity 1: Plastic Bottle racer!

Constructing a Bottle Racer

The spool racer has all the inner workings of how a robotic motor should perform. It uses a plastic bottle of water that is powered by energy stored in a wound-up rubber band. Gather the tools and materials below and follow the instructions on the next pages.

Tools and Materials Needed:

Quantity	Description of Tools and Materials
1	500 ml cylindrical plastic bottle of water
1	Large nail (3 to 4 inches long)
3	Rubber bands (Note: You can use more than three or less, provided they stretch approximately the length of the bottle without being extremely tight.)
2	Jumbo paper clips
1	Small steel washer or any similar washer
1	Drinking straw (or pencil or bamboo skewer approximately the same length as a straw)
1	Masking tape or rubber bands that will fit around the outside of the bottle
1	Candle
1	Pliers

Assembly:

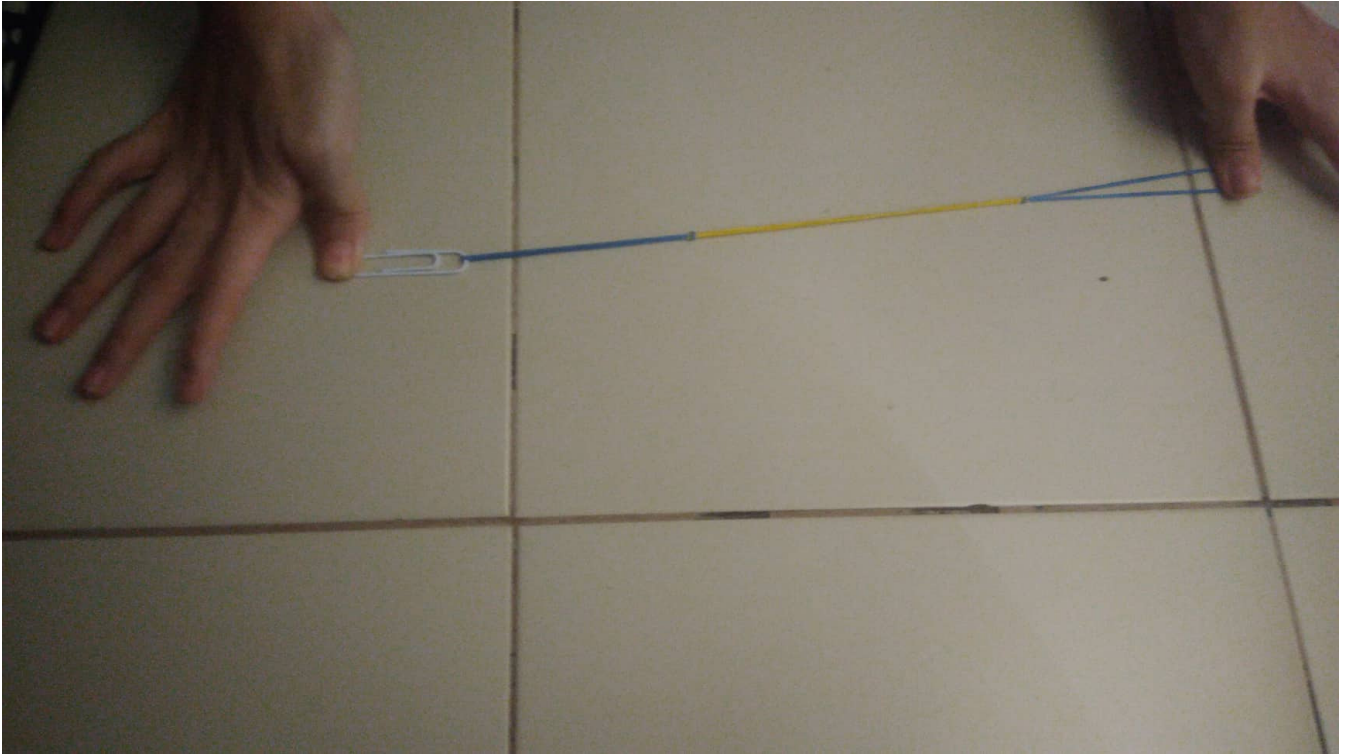
1. Make a hole in the center of the cap using a hot nail. Using pliers to hold the nail, heat it with a lit candle. Remove the cap for now. You'll need it again in Step 6.
2. Using the hot nail, make a hole in the center of the bottom of the plastic bottle.

3. Bend one jumbo paper clip to make a hook as in the photo below and set it aside. You will need this in a moment.
4. Loop the three rubber bands together as shown in the photo below, pulling them tight to form a three-band chain. Then thread the end of the rubber-band chain onto the other paper clip.
5. Push the free end of the rubber band chain up through the hole in the bottom of the bottle, and then feed the rest of the chain into the bottle. If necessary, use the straight end of the paper clip hook to help push the rubber bands through the hole.
6. Pull the top end of the rubber-band chain out the mouth of the bottle, either by reaching in with a finger (if possible) or by using the paper-clip hook. When the end of the rubber-band chain emerges from the top of the bottle, grab it with your fingers and thread the end loop through the bottom of the bottle cap and then through the washer (see photo below).
7. Screw the cap back onto the bottle while still holding the end loop, and then push about 3 inches (7 cm) of the straw through the loop. The rubber band will hold the straw in place against the washer and bottle (see photo below).
8. Check that the paper clip attached to the rubber band at the other end is held flush and centered against the bottom of the bottle and it doesn't stick out past the edge of the bottom (see photo below).
9. Use your finger to wind up the rubber band - try starting with around 25 turns. Put the bottle on the floor, release it - and watch it go! (if it doesn't go, try winding a few more turns.)

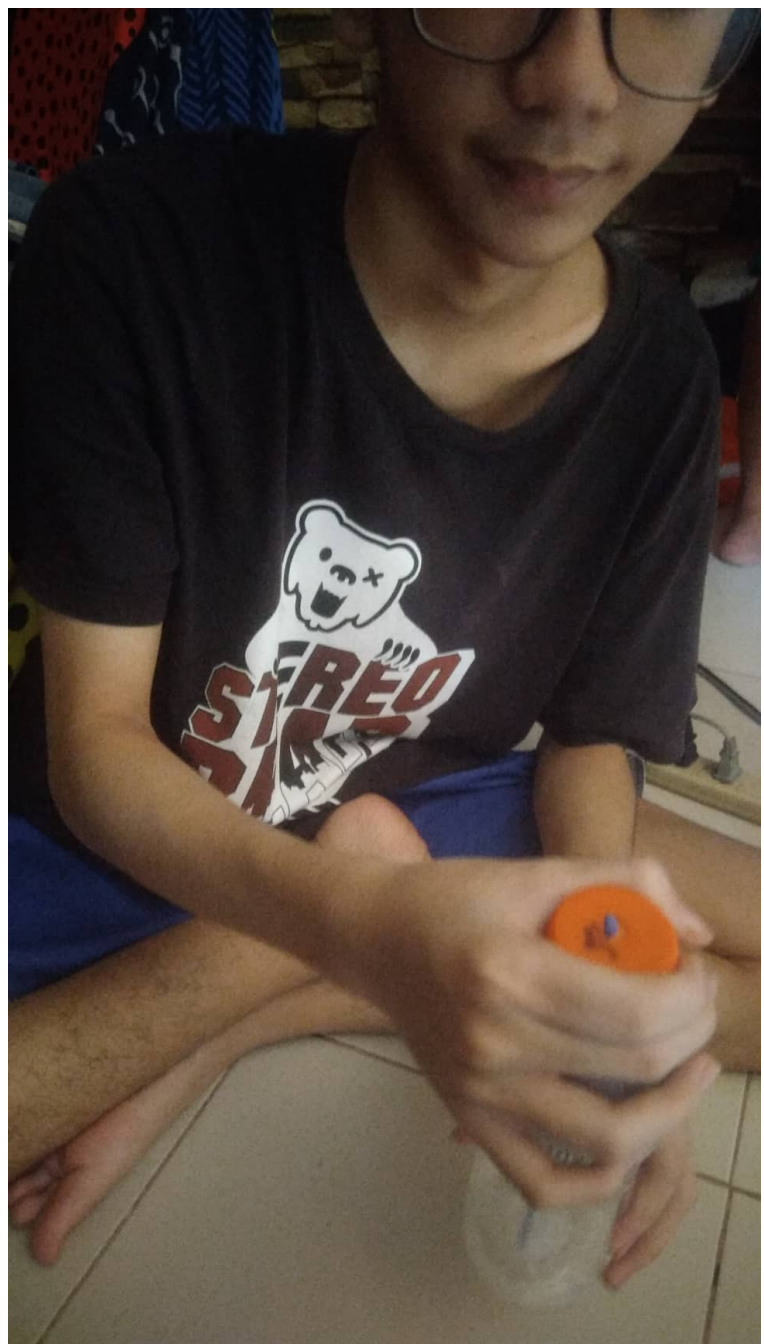
Documentation:













Guide Questions:

1. What is your feeling while doing this activity? I felt that I was doing good during the activity.
2. What are the factors that help you to do the task accordingly? Mainly, the instructions are very clear with images indicating the result that you should get after that step is done.
3. If you would have the opportunity to change or add any material in this design to improve your racer. What material would that be and why? I would change the cap to be thinner because it is quite difficult to make a hole with a thick cap.

Activity 2: Let's Race!

Directions: After building your plastic bottle racer it's now time to test performing this activity.

Materials Needed:

Improvised plastic bottle racer, meterstick (any tool that measures distance)

1. Hold your bottle racer and wind up the rubber band around 25 and turns then release it at a starting point on the floor and measure how far did it go. Record distance traveled in the table below.
2. Repeat step 1 and this time wind up the rubber band for 35 turns.
3. Repeat step 1 and this time wind up the rubber for 45 turns .

Documentation:











Water bottle racer rubber band wind up	Distance (inches)
25 turns	56.1 in
35 turns	60.3 in
45 turns	69.3 in

Guide Questions:

1. Which among the turns of the rubber bands ended up the farthest and the nearest distance travelled? Why?

45 turns reaches the farthest while 25 turns seems to be the nearest distance travelled?

2. What is the relationship between distance travelled by the bottle racer and the number of turns in the rubber band?

They are directly proportional to each other, meaning if one of the factors increases, the other one also increases.

3. If you were to add or change any material to your bottler racer to travel further what would that be and why?

I would change the stick or pen to be smaller for it to not stop the bottle too much.