



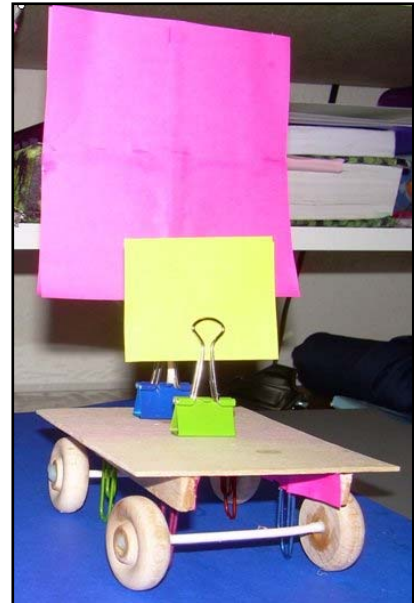
Sailing Cart

Introduction

In this project, you will create a hybrid vehicle that combines the sails of a boat with the wheels of a car. The idea is to build a rolling cart that is powered by wind alone. We will then test the carts by setting up a fan or blower in the room or in a hallway to see whose cart can go the farthest or fastest. Your SEEK presenter (the one who's always telling you what to do) will tell you whether the contest will be judged for speed or distance or both.

Directions

The instructions below are for a *sample cart*. This is meant to give you an idea of how to start. It can be especially tricky to make a base for your cart with wheels that can roll. However, you are encouraged to modify the design as you go along to make it better. Remember that this is a competition and everyone starts out with the same basic instructions. You'll have to think "outside the box" and make your cart different if you want to win. This is where your engineering skills come in!



Things to Consider

- Traction – Normally, you might think that engineers would consider friction a bad thing. Friction slows things down, right? Well it turns out that with wheels, you actually want to have a certain kind of friction with the ground. This special kind of friction is called traction, and it lets the wheel roll instead of sliding or skidding. Try to make sure your wheels have enough traction to actually roll instead of just sliding.
- Air Resistance – Like friction, air resistance is another kind of resistance that can actually be used for good. Normally, you might think that a vehicle should have low air resistance in order to go fast. However, when the vehicle is powered by wind, you actually want high air resistance so that the vehicle catches the wind and gets pushed along by it. Try to give your cart a large air resistance by adding sails so that it catches the wind.

- Center of Gravity – Have you ever been in a bus or SUV that made a turn so sharp it felt like it would fall over? Hopefully it didn't! That's because the engineers designed these vehicles with a low center of gravity. That means the heaviest parts of the vehicle are close to the ground, and the parts that are high above the ground are kept as light as possible. This helps to prevent the vehicle from tipping over. Try not to make your cart too tall, since that would raise its center of gravity. A high center of gravity would make it more likely to tip over.

Available Materials

These are the materials that your SEEK presenter should have available for you to use. There is no limit to how much you can use, unless the presenter feels you are asking for too much. Also remember that the more you put onto your cart, the heavier it will be. A heavier cart is more difficult to push and so it may not go as far or as fast as a lighter cart.

- Cardboard
- Popsicle Sticks
- Paper Clips
- Small Binder Clips
- Wheels (read the *Note about Wheels* below)
- Q-tips or Small Wooden Dowels
- Plastic Grocery Bags
- Hot Glue Gun
- Masking Tape
- Construction Paper

Note about Wheels: If the SEEK presenter does not have pre-made wheels available, you can make your own wheels by cutting circles out of cardboard. You'll want to make them as perfectly circular as you can. One way to do this is to trace out the bottom of a coke can or other cylindrical object and then try to cut along the traced outline.

Materials for Sample Cart

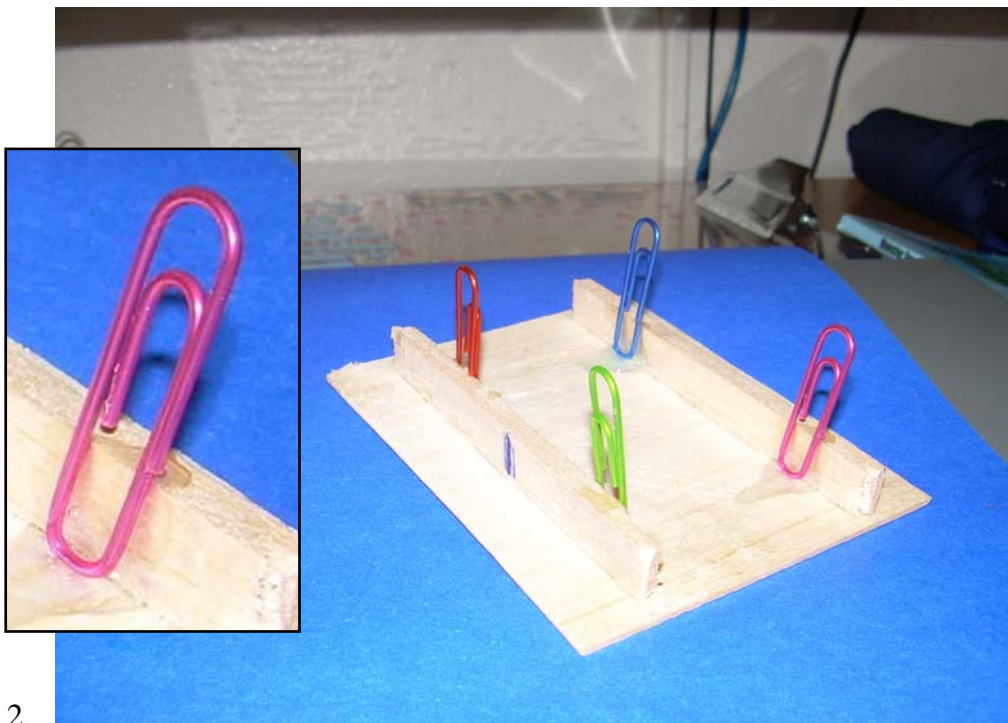
These are the materials that you will need to make the basic *sample cart*. Remember, this is only a starting point. It is not the best design possible. Try to think of ways to make your design better than this one if you want to win!

- Cardboard Square
- 4 Popsicle Sticks
- 4 Paper Clips
- 2 Small Binder Clips
- 4 Wheels
- 3 Q-tips or Small Wooden Dowels
- 1 Sheet of Paper

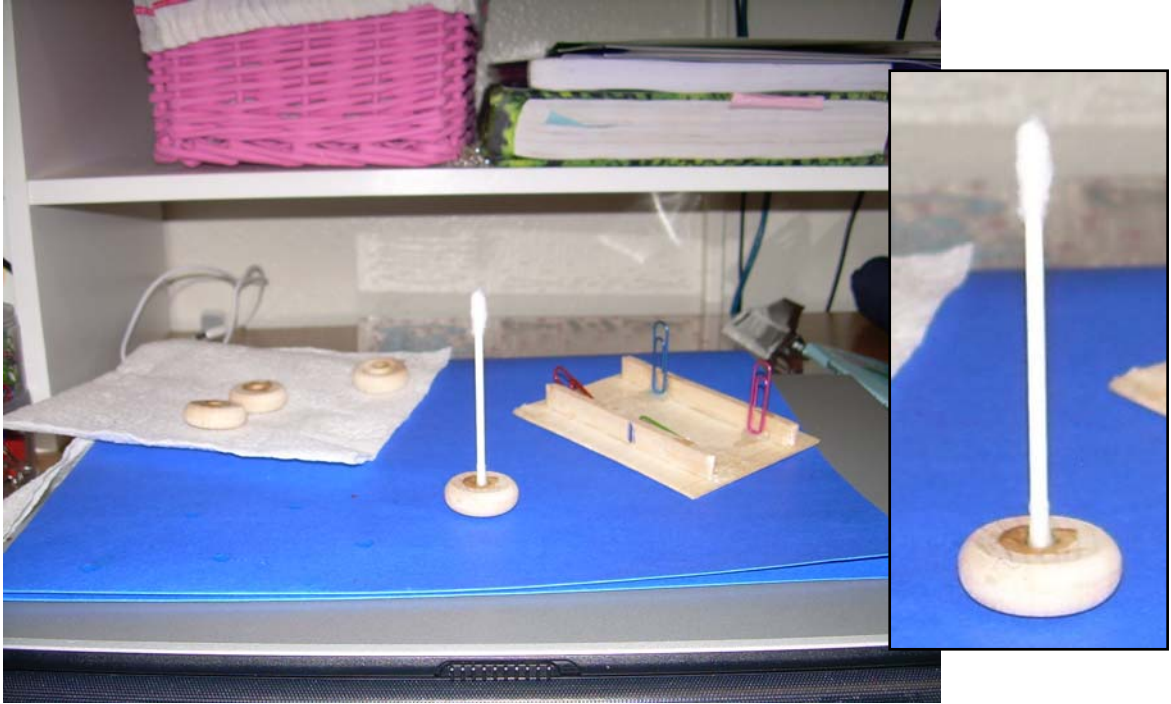
Instructions for Sample Cart



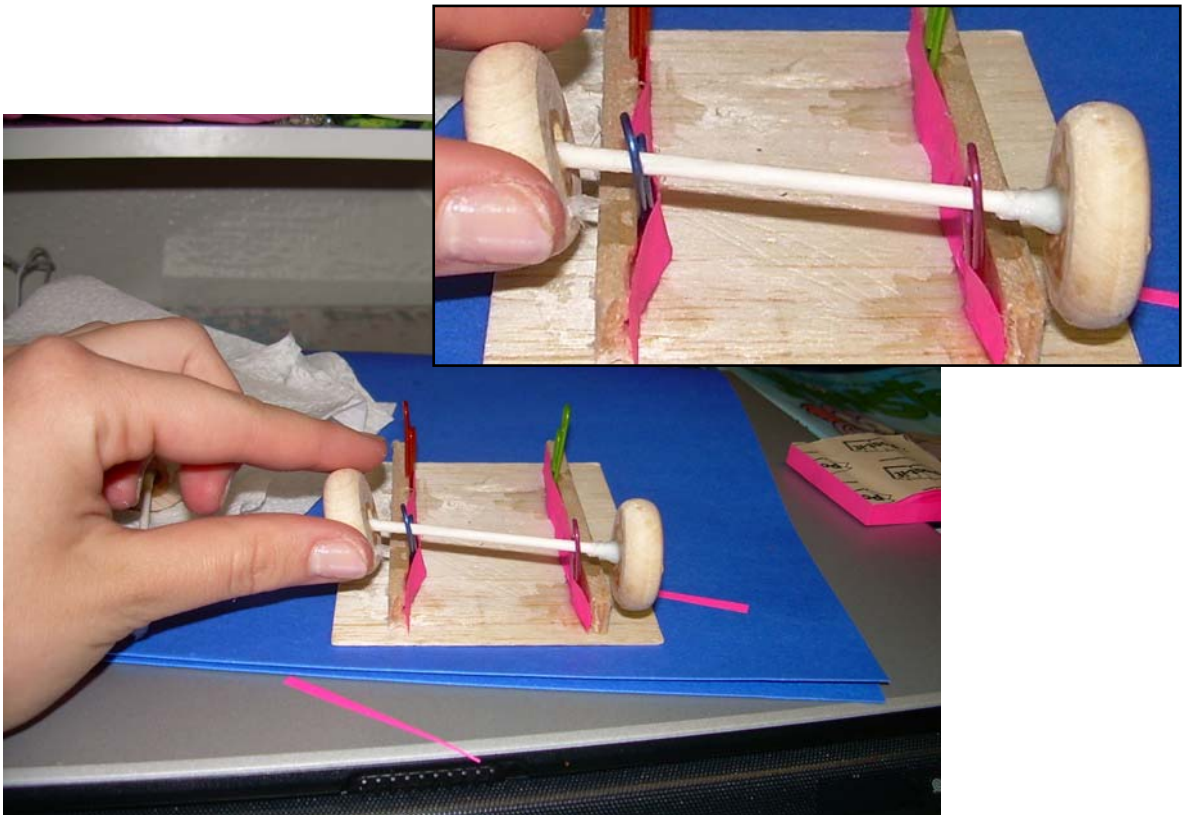
1. Glue the popsicle sticks to each other in pairs of two. Then attach the popsicle stick pairs to the bottom of the cardboard. Separate the two rows of sticks by a little less than the length of a Q-tip.



2. Glue the paperclips to the popsicle sticks (with the double end of the paperclip up).



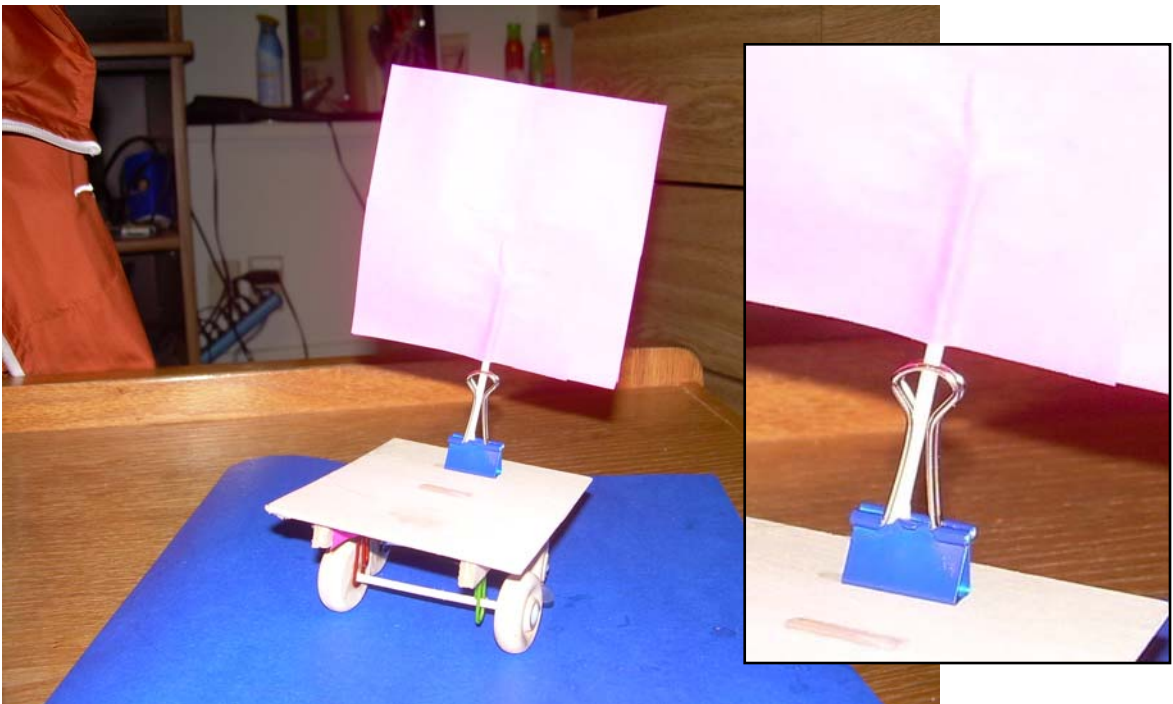
3. Attach one end of the Q-tip to one wheel.



4. Put the Q-tip through 2 paperclips (on opposite sides of each other) and then glue on the other wheel. If the wheels are too big and the cardboard blocks them, cut away some of the outside of the cardboard.



5. Do the same for the back two wheels.



6. To make the sail, glue one end of Q-tip to the paper and place the other end in the binder clip. Glue the bottom of the binder clip to the top of the cardboard.



7. You can optionally place a smaller sail in front to increase stability.