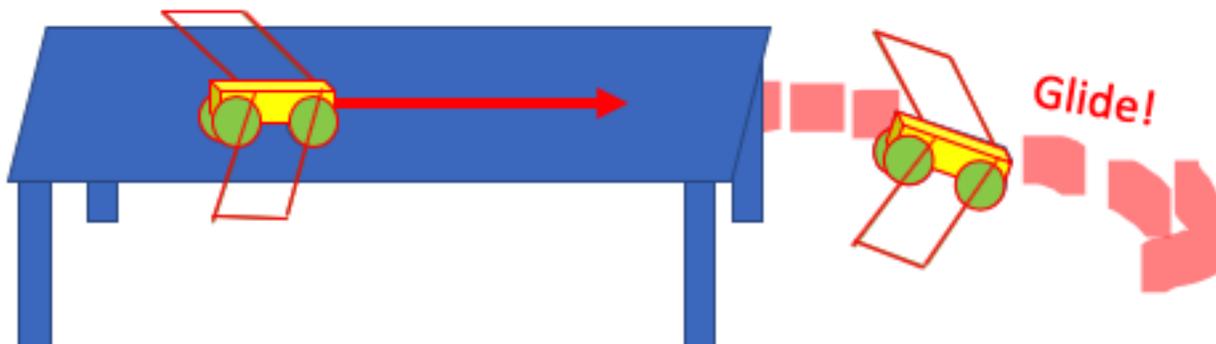




Gliding Car from Recycled Materials

Build your own Gliding Car:

Can you believe you can make your own car that will glide in the air after rolling off a table? All you need are things around your house; things that would be recycled anyway. For even more fun, if your family is large enough, you can make two or more teams, each with a car in the competition. You can challenge your brother, sister, cousin, grandparents, or even a parent/guardian, to name a few!



Your Goal:

Design and build a gliding car. Your car must:

- Be able to roll across a table and glide through the air after being given **one** push.
- Have at least 3 wheels.
- Have a minimum of one set of wings.

Suggested Building Materials:

The gliding car can be made primarily with materials found around the house that would be recycled.

Body: Cardboard, paper, toothpicks, plastic bottles, popsicle sticks, etc.

Wheels/Axles: Straws, wooden dowels, bottle caps, jar tops, metal brads, paper clips, etc.

This activity is courtesy of ICE, the Institute for Chemical Education at UW-Madison's Chemistry Department. It is adapted from an Engineering Challenge Activity at a hands-on Fun with Chemistry Camp summer program.

Wings: Lightweight paper, cereal-box cardboard, coffee filters, balsa wood, tissue paper, etc.

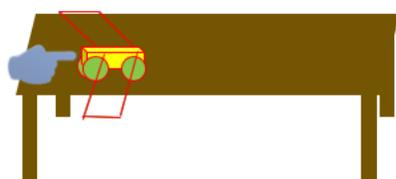
General Construction Materials: Glue, tape, scissors**, hot glue** etc.

****Note:** *It is strongly recommended that young children be supervised when handling scissors and that parents/guardians handle the hot glue to prevent injuries.*

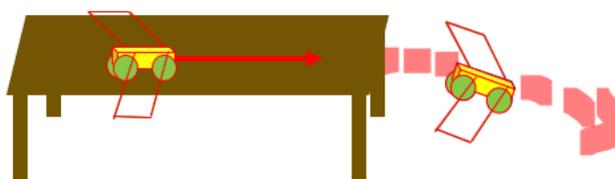
Competition:

- The official gliding distance includes the glide and how far the car rolls after it lands, measured from the front edge of the car to the front edge of the table (see diagram below)
- Each team will be given two jumps and judged on the furthest one.
- The gliding car that finishes the farthest from the table wins!

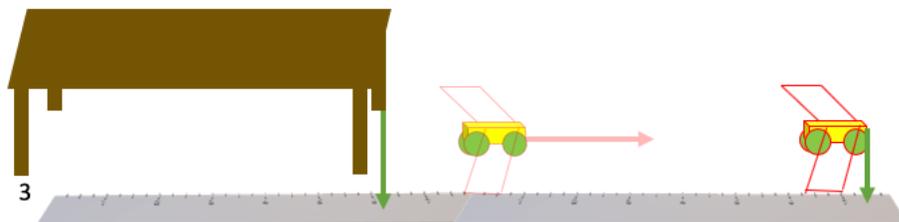
Diagram with Instructions



1 Place the gliding car on the table and give it one push



2 Allow the car to glide along the table freely and glide off the table



3 The car should roll freely on the floor.

4 Measure your gliding car from the front the car to the front edge of the table (green arrow by the table). The longest distance wins!

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Learning Objectives:

- Introductory aerodynamics—cars with less surface area on the front will generally glide further than cars with more surface area on the front, if all other things (such as weight and wing surface area) are the same.
- Introduction to design—if a sketch is made before the car is built, this activity can be a fabulous introduction to design by incorporating explanations for various features found in the designs of the car.
- Introduction to pivot points—if the car tips while it is gliding through the air, it is most likely tipping due to an uneven distribution of weight. The reason the car tips a certain direction is because the force of gravity applied toward that side is greater than the force of gravity applied toward the light side. Force of Gravity = mg , where m is the mass, and g is the gravitational acceleration on earth (9.8 m/s^2). Because the gravitational acceleration (g) is the same in the equation for the front of the car and the back of the car, the car will fly horizontally only when the mass of the front of the car equals the mass of the back of the car:

$$\text{Force of gravity, front of car} = m_{\text{front}}g_{\text{earth}} = m_{\text{back}}g_{\text{earth}} = \text{Force of gravity, back of car}$$

Troubleshooting:

- *If the car flips over when it lands on the floor instead of rolling...*

A nice way to help young children learn about pivot points on their gliding car is to make a video with a smartphone as the car runs off the table. The direction the car tips when it leaves the table will be the heavier side of the car.

- *If the car does not really “glide” through the air...*

The materials used for the wings might be too heavy. The cars that we constructed at the ICE Fun with Chemistry Camps were constructed with light-weight balsa wood and very thin paper and they generally were able to glide about one yard from the end of the table. Try making the wings lighter and with greater surface area and this might help the car glide farther.

- *If the car does not roll across the table...*

The wheels are likely encountering too much resistance, or the wheels are not round enough. Switch the axles for a more free-turning material. Alternatively, if the table that is being used has nothing else on it, elevate the back legs to create a slight incline.

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