



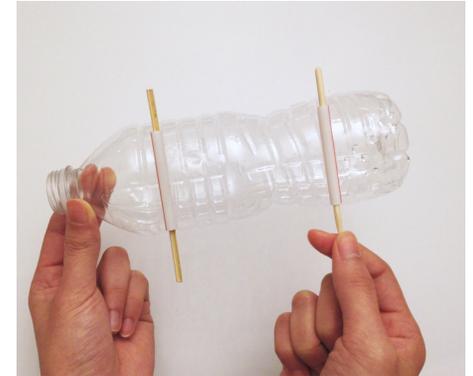
## Balloon Car

### Supplies

- 2 straws
- 1 plastic bottle
- 1 wooden skewer
- 4 bottle caps
- 1 balloon
- tape
- X-Acto knife (ask adult to help)



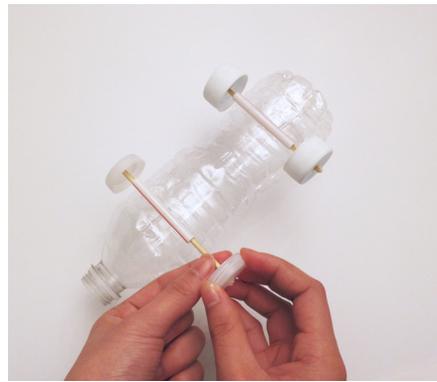
1. Cut one straw in half and tape two pieces to one side of bottle.



2. Cut skewer in half, push one piece through each straw.



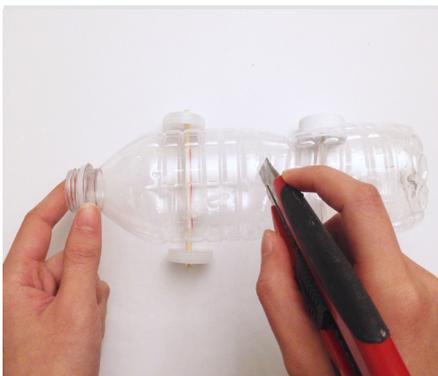
3. Poke +-shaped holes into center of each bottle cap.



4. Press bottle caps onto ends of skewers.



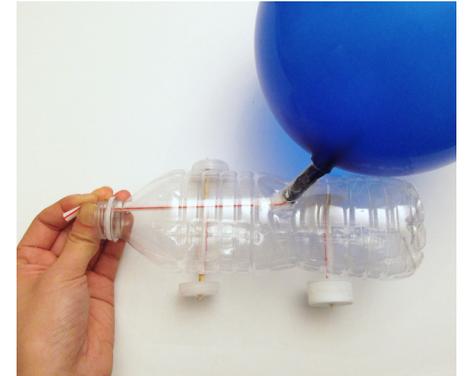
5. Insert one inch of straw into balloon and tape tightly.



6. Cut a hole on top of bottle.



7. Push straw through hole and tape to bottle securely.



8. Blow up balloon through straw, pinch end, and release on ground.

## Car not going straight?

- *Realign axles so that they are parallel to each other.*
- *Make sure the hole in each bottle cap is centered.*
- *Make sure balloon straw is pointing straight backwards.*
- *Try using cardboard or CD wheels.*
- *Experiment!*

### Glossary

**Physics:** the type of science studying the nature and properties of matter and energy

**Energy:** the ability to do work

**Potential Energy:** energy an object has stored because of its position or condition

**Kinetic Energy:** energy an object has from moving

**Law of Conservation of Energy:** energy cannot be created or destroyed; it can only be transformed from one form of energy to another

**Newton's Third Law of Motion:** for every action there is an equal and opposite reaction

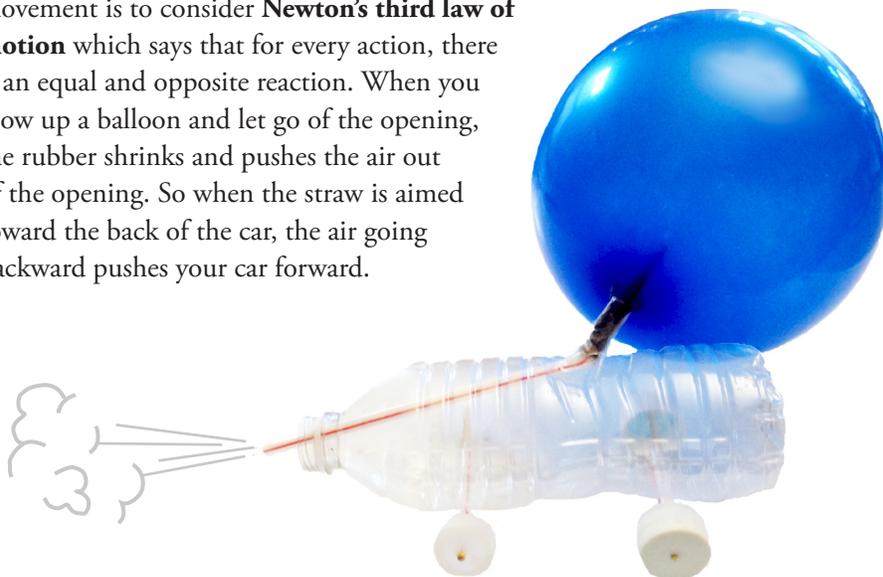
**Oxidizer:** a key substance for chemical reactions like combustion

## The Science Behind Balloon Cars

Besides being a fun activity, a balloon car can teach you a lot about **physics** and **energy**. When you blow up a balloon, it stores **potential energy** in the stretched balloon and the air inside. When you let go of the balloon, the potential energy is transformed into **kinetic energy** as the balloon zooms around the room.

The **law of conservation of energy** says that energy never “disappears”—it just transforms into another kind of energy. The more you blow up the balloon the more potential energy it stores, which transforms into more kinetic energy when you let go—making the car go faster and farther.

Another way to think about the balloon's movement is to consider **Newton's third law of motion** which says that for every action, there is an equal and opposite reaction. When you blow up a balloon and let go of the opening, the rubber shrinks and pushes the air out of the opening. So when the straw is aimed toward the back of the car, the air going backward pushes your car forward.



## To the Moon!

Space rockets use Newton's third law too! Jet aircraft and rockets fly by using an **oxidizer** (such as oxygen) to burn solid or liquid fuels (such as kerosene or liquid hydrogen). This transforms the fuel into gas that is shot in fast streams out the back nozzle. Jet engines pull in oxygen from the air to use as an oxidizer, but in space, there isn't any oxygen to take in. Instead, rockets carry their own oxidizer. So when the rocket pushes the streams of gas backward, the streams of gas push the rocket forward. This idea is used in NASA's rockets like the Saturn V rocket, which launched the first men to the moon in 1969.

