The Balloon Rocket Car Experiment [1]

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Balloon Rocket Car Experiment, NASA/Carla Cioffi

You could also make a game out of it by asking all your friends to make one of their own and then set up a balloon rocket car race!

In this experiment, you won't just be having fun. You will also learn about the laws of motion and how it makes your balloon rocket car work.

Materials

To create a balloon rocket car, you will need the following items:

- plastic water bottle, about 16-20 oz.
- 4 plastic bottle caps
- flexi drinking straws
- duct tape or masking tape
- 4 pins
- party balloon
- hammer and nails
- wooden skewers

Procedures

The Car

The very first thing you'll have to do is to create the car itself. Take the plastic water bottle. This will serve as the body of the car. Next is to attach its wheels on each side using the bottle caps. You do this by taking the flexi drinking straws and cutting them in two. Use the duct tape or the masking tape to attach them to the body. The 4 pins will serve as the wheel axles. Run them through the straws to prevent the wheels from being crooked.

Get a hammer and nail to create holes through the centre of all the 4 bottle caps. Part the wooden skewer in two, approximately 1.5 inches longer than the cut straws. Insert the wooden skewers through the centre holes of the bottle cap. Test your car to make sure the wheels roll smoothly.

The Balloon Rocket

Now that you have created your car, it is time to create the balloon rocket that we will be attached to the bottle car. Take the party balloon and inflate it. Create a nozzle by taping 4 drinking straws to each other. Insert the straw in the opening of the balloon and put masking tape around it to secure the position of the straw to the balloon opening. Make sure that there is no other room for air to exit through than the straw you have just inserted. The size of the nozzle is important as creating a very narrow one will prevent the air from freely escaping from the balloon thus affecting the speed of your balloon rocket car. On the other hand, if the nozzle is too wide, the air will escape too quickly, affecting the running distance of your car.

Attach the Balloon to the Car

The next procedure is to attach the balloon to the bottle car. You can do this by cutting an X shape on top of the car with the use of a knife. Make sure an adult is watching you perform this step, or you can ask the adult to do it for you to avoid accidents or any form of injury. After cutting the X shape on top of your car, thread the nozzle through the opening and out the opening of the plastic bottle. Allow one inch of the nozzle to stick out of the opening of the bottle. Now you're done!

Place your car on a long flat and hard surface to test that your balloon rocket car is working. Inflate the balloon using the straw protruding out of the bottle opening. Hold the base of the balloon so it stops the air from being released. Let your car zoom away by letting go of your grip, allowing the air to exit through the straw nozzle!

Discussion

As soon as you release your grip, the car starts running forward, thus illustrating Newton's Third Law of Motion called Action and Reaction. This law states that "Every action has an equal and opposite reaction". Look at the balloon rocket car experiment and notice that as soon as you let go of your grip the air escapes through the straw nozzle, propelling the car across the flat surface in the opposite direction because the balloon air is under pressure. Here, the air escaping the balloon is the action, while the car moving towards the other direction illustrates the reaction.

Links
[1] https://staging.explorable.com/en/balloon-rocket-car-experiment
[2] https://staging.explorable.com/en
[3] http://www.flickr.com/photos/nasahqphoto/8673152554/