

BALLOON POWERED CAR

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CLASS DESCRIPTION:

In this class, students will learn some basic physics concepts and use recycled/local materials to build a toy car that is propelled by a balloon.

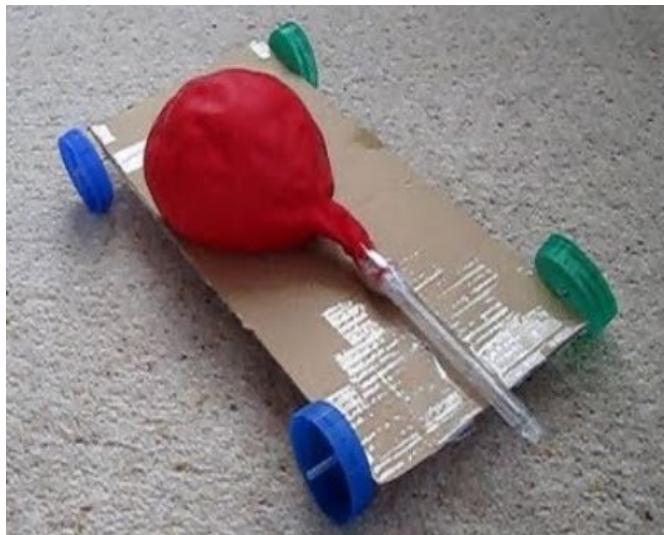
TOTAL CLASS TIME: 90 minutes.

CLASS OUTCOMES:

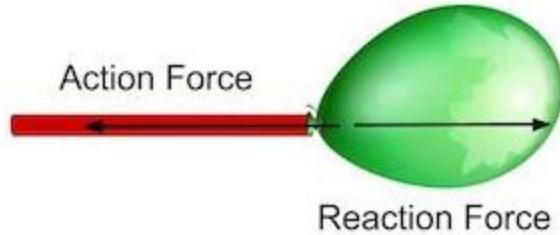
- Design and build your own balloon-powered car that will travel as far and fast as possible.
- Students will understand the basic concept Kinetic energy, Potential energy, Conservation of energy, and laws of motion.
- Students will use engineering design method and to build a car using local materials.

INTRODUCTION

The balloon car is made from recyclable and local materials which demonstrate some basic concept of Physics. It is pushed forward by air escaping from a balloon, and it is fun and easy to build with materials you already have around your house.



When the balloon is inflated and the car is released, the rubber contracts and pushes the air out the nozzle. This means there must be an equal and opposite reaction that pushes back the air on the rubber, propelling the balloon forward. This uses the principle of the Newton's third law of motion that states "For every action there is an equal and opposite reaction".



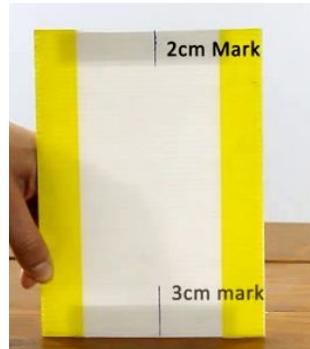
Some of the energy is also converted to heat due to friction. According to the law of conservation of energy, the total amount of energy is conserved. Energy never “disappears” it changes to another form.

MATERIALS NEEDED

- Piece of carton
- Four plastic bottle caps
- One straws
- One Balloon
- one pen-pipe
- Tape
- wooden skewer
- Scissors

PRE-CLASS PREPARATION

- Cut one of the straws in half.
- Cut a carton - the size of the carton depend on how big/small the size of the car will be .



PROCEDURES

- **Step 1:** Tape the 2 pieces of straw to one side of the carton (Tape it to both end of the carton).
- **Step 2:** Cut the wooden skewer in half and push each piece through one of the straws. These will form your axles.
- **Step 3:** Connect/press each bottle caps to the ends of the wooden skewer. These will form the car wheels.

- **Step 4:** Tape the neck of the balloon around one end of the pen-pipe. Wrap the tape very tightly so the connection is airtight.
- **Step 5:** Tape the pen-pipe with a balloon on the carton. Wrap the tape very tightly on the straw so the pen-pipe doesn't loose. The tape will secure the pen-pipe to the carton.
- **Step 6:** Blow through the pen-pipe to inflate the balloon, then put your finger over the tip of the pen-pipe to trap the air.
- **Step 7:** Put the car down on a flat surface and release your finger.

See images of balloon cars for different structures



There are many different ways to build a balloon car. Turn this into an engineering design project and try building your car with different materials. For example: *What happens if you use a plastic bottle instead of a carton for the body? What happens if you use different diameter straws or bigger wheels? What about different materials for the wheels and axles?*

DISCUSSION/OBSERVATION

When the balloon is inflated, it stores potential energy in the form of stretched rubber and the compressed air inside. When the balloon is released, it zooms around the room. This energy is converted to kinetic energy (which is the energy of motion). When the balloon is taped to a straw and attached to the body of the car, however, you can control the direction of the escaping air.

When the end of the straw is aimed backward, the air pushes your car forward, as described by Newton's third law of motion that states "For every action there is an equal and opposite reaction".

Your design will be most efficient if the straw is pointed straight back and not downward or to the side. The more you inflate the balloon the more potential energy it stores, which in turn is converted to more kinetic energy, according to the law of conservation of energy which makes the car moves faster.

REFERENCES

<https://www.scientificamerican.com/article/build-a-balloon-powered-car/>

<https://www.zlifeeducation.com/blog/balloon-powered-car/>