

BALLOON POWERED CAR

Teacher Notes

Overview

Subject: Science and Technology

Grade: Years 7 – 9

Topics: Interaction between materials and energy and understanding resistance and propulsion.

Curriculum:

Science Inquiry Skills

- Identify questions, problems and claims that can be investigated scientifically and make predictions based on scientific knowledge ([VCSIS107](#))

Recording and processing

- Construct and use a range of representations including graphs, keys and models to record and summarise data from students' own investigations and secondary sources, and to represent and analyse patterns and relationships ([VCSIS110](#))

Analysing and evaluating

- Use scientific knowledge and findings from investigations to identify relationships, evaluate claims and draw conclusions ([VCSIS111](#))

Objectives

1. Construct a car propelled by balloons that can travel 2m distance and above
2. Gain an understanding of types of energy, energy loss, friction and use that to improve the car
3. Construct a range of representations, including tables and graphs, to display data and analyse patterns or relationships
4. Summarise and draw conclusions based on data found throughout investigation

Key Concepts

Energy. The capacity for doing work. It can exist in potential, kinetic, thermal, electrical, chemical, nuclear, or other various forms. (Britannica)

Kinetic energy. The work needed to accelerate an object from rest to motion. An object that has any motion, either vertical or horizontal, has kinetic energy. (Physics Classroom) For example, As you release the car and the air expels from the balloon, this energy is converted into kinetic energy, also known as the energy of motion.

Potential energy. The stored energy in an object due to its position relative to some zero location. For example, the cars potential energy is the air inside the balloon and as the balloon expands, more potential energy is created.

This propulsion method focuses on Newton's Third law of motion. The law states that for every action, there is an equal and opposite reaction. Which is similar to saying, if object A exerts a force on object B, then object B also exerts an equal force on object A. In the case of the balloon car, the action is the air rushing out of the balloon, pushing against the air behind the car. The opposite or equal reaction is that the air behind the car pushing against the car with the same force, causing the car to propel forwards.

Additional Resources

<https://www.stevespanglerscience.com/lab/experiments/balloon-powered-race-car/>

https://www.sciencebuddies.org/science-fair-projects/project-ideas/Phys_p099/physics/balloon-powered-car-challenge#summary

How the car works and different tests: https://video.deakin.edu.au/media/t/1_impfigjt

Creating the Balloon Model car: https://video.deakin.edu.au/media/t/1_qclcgdg

Materials

Milk carton or water bottle

Drinking straws

Bamboo skewers

Light toy truck wheels or plastic screw tops from milk bottles

Balloons

Tools

Ruler/Measuring tape

Scissors

Craft knife or blade

Hot glue gun with glue

Sticky tape

Safety glasses

Risk management

The main hazards are the hot glue gun and craft knife. The hot glue gun does get very hot at the tip of the gun and can cause minor burns. These need to be monitored and students must be warned of safety instructions prior.

While cutting the skewers with either scissors or a scalpel, sections can fly off unexpectedly. Students should wear safety glasses/goggles so as to protect themselves from anything getting in their eyes.

Activity

Students follow the directions in CONSTRUCTING A BALLOON POWERED CAR resource. Once the car has been completed to the students liking and works successfully, students will make specific alterations to different parts of the car. These can include but are not limited to, adding and distributing weights, altering the friction of the wheels and changing balloon types or creating more resistance of air travelling out of the balloon.

Students will measure the distance travelled by the car and the time taken for each variation in a table.

Expected Results

The original car design will travel only about 1-2m. Once the car is modified and the milk carton cut open, the car will travel slower, but further. Adding weights to the car will add some distance, especially if added towards the front of the car. However, if too much weight is added the car will slow down too much. After using different sorts of balloons, it was found that round balloons worked better than long, skinny balloons due to the ability to blow them up to a greater capacity.

Difficulties

Having little gap between the wheels and straw is important. A large gap will make the wheel's wobble, causing the car to veer left or right and overall reducing the distance travelled. With no gap the straw will impede the wheels turning.

Having a bit of resistance has been found to stop the car from travelling fast but allows it to travel further, however getting the hole for the balloon to be a good size can be difficult.

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