Girl Scouts @HOME

JUNIORS

Mechanical Engineering: Balloon Car

Badge Overview

Learn about air power and create an alternative fuel car. When you've earned this badge, you'll know how to engineer a balloon-powered car and understand potential energy, kinetic energy, and jet propulsion.

Badge Components

1. Learn about potential and kinetic energy

Watch this **video** to find out a little more about potential and kinetic energy.

2. Design and build a balloon car

You can find instructions on how to make a balloon powered car on the **Scientific America website**

3. Test your balloon-powered car

Can you answer these questions:
(The answers to these questions and an explanation are at the bottom of this section.)

- ○ Where is the energy stored that makes the balloon car move? The term for stored energy is POTENTIAL energy.
- ○ How can you increase the balloon's potential energy? You can tell when potential energy stored in the balloon is being used because you see it move. The term for motion energy is KINETIC energy.
- ○ What are some examples you can see of kinetic energy that happen when your balloon car moves?

4. Analyze and share your results

Analyze how your car performed; what problems did your car have and what can you do to make your balloon car work even better?

5. Brainstorm ways to improve your design

What do you need to change or improve?

- ○ Try to make it go faster or further. You will need to time your car or measure how far it goes so you will know if it improved. Remember to make sure you only change one VARIABLE or thing at a time so you know if it makes a difference. This is called making it a FAIR TEST and is an important part of the SCIENTIFIC METHOD.
- ○ Now you have the best car you can make, show someone in your house how amazing it is and maybe challenge them to make one too so you can have a race!!

ANSWER KEY

a. The potential energy is stored in the stretched balloon.

b. You can increase the balloon's potential energy by blowing the balloon bigger.

c. The balloon deflates; the car moves; the wheels turn; the car moves forward.

WHAT'S HAPPENING? When you blow up the balloon, the stretched rubber stores the energy like a twisted rubber band. This is **POTENTIAL** energy, which happens because the balloon rubber is not in **EQUILIBRIUM** (balanced/even/at rest) — you have to hold it shut or the balloon will deflate. When you let go of the balloon, it deflates and the trapped air rushes out and pushes against the outside air causing the wheels to spin and the car to move forward. The deflating of the balloon is the CONVERSION OF POTENTIAL ENERGY TO KINETIC ENERGY (kinetic energy is the energy of motion). The balloon deflating, moving the air, turning the wheels and the car moving forward are all examples of kinetic energy.

Materials

- Yard stick or tape measure
- Stop watch or timer
- Plastic bottle
- Four plastic bottle caps
- Wooden skewer
- Two straws
- Balloon
- Tape
- Scissors or sharp knife (Have an adult use or supervise your use of this tool.)

Florida Educational Standards

The content of all Girl Scout national proficiency Badges and Journeys have been correlated by grade level to national and state learning objectives.

Click here for more information on how Girl Scout Badge-work supports Florida's educational standards.

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