# The Balloon-Powered Car Project: Exploring Propulsion and Motion

**Florida State Standard:**
SC.5.P.13.1: Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity, friction, and magnetic force.

**Florida State Benchmark:**
SC.4.P.12.1: Recognize that an object in motion always changes its position and may change its direction as a result of the application of force.

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## Objective:

- Understand propulsion and Newton's Third Law of Motion.
- Explore the effects of thrust, friction, and weight distribution.
- Apply problem-solving skills to design and test a balloon-powered car.

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## Materials:

- 1 standard-sized balloon
- 4 bottle caps (as wheels)
- 1 empty plastic water bottle (500 ml recommended)
- 2 barbecue sticks (as axles)
- Tape or glue
- Scissors
- 1 straw (optional, for smoother axle rotation)
- 1 straw (optional, for a better connection between the balloon and the bottle)

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## Safety Precautions:

To ensure a safe environment, handle scissors with care and keep them away from others. Supervise students when working with sharp objects and small materials like bottle caps to prevent choking hazards. Keep the work area organized to minimize the risk of accidents. Emphasize the importance of cleaning up immediately after the activity to avoid leaving any sharp or hazardous items behind.

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## Procedures:

1. **Preparation:**
    - Clean the water bottle and position it horizontally on a flat surface.
    - Using scissors, carefully create small holes on each side of the bottle to accommodate the axles.
2. **Wheels and Axles:**
    - Puncture small holes at the center of each bottle cap to serve as wheels.
    - Thread the barbecue sticks through the holes in the bottle caps to create axles and wheels.
    - Insert the axles through the holes in the water bottle, ensuring the wheels can spin freely.
3. **Attaching the Balloon:**
    - Stretch the balloon and securely tape its neck to the top of the water bottle.
    - Use a straw if needed to create a tighter seal and direct airflow for improved propulsion.
4. **Testing the Car:**
    - Inflate the balloon and pinch its neck to prevent air from escaping.
    - Place the car on a smooth, level surface.
    - Release the balloon's neck and observe the car's motion, taking note of its speed and distance.

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## Clean-up:

After the experiment, dispose of waste materials, such as balloon remnants and small scraps, in a trash bin. Collect reusable materials like scissors, tape, and any unused components, and store them in their designated places. Encourage students to double-check their workstations to ensure no debris or sharp objects remain. Wipe down tables and surfaces to leave the area clean and safe for future use.