Balloon-Powered Bottle Car: Step-by-Step Observation Sheet

Objective:
Demonstrate Newton's Third Law of Motion (For every action, there is an equal and opposite reaction) by building a balloon-powered car.

Materials:

1 plastic bottle
2 plastic straws
1 paper straw (for axels)
2 wooden skewers (for axels)
4 bottle caps (for wheels)
1 balloon
Self-adhesive tape

Step 1: Prepare the Bottle

Action: Take the plastic bottle and remove any labels. This will be the body of the car.

Observation:

The plastic bottle will hold everything together and act as the car's main structure. It is stable and has a flat surface to attach other parts.

Step 2: Attach the Straws

Action:

Take the two plastic straws and tape them horizontally on the bottle, near the neck of the bottle.
The straws should be taped securely and should point outwards from the bottle.

Observation:

The straws will allow air to flow through when the balloon inflates, directing the air backward to make the car move forward.

These straws represent the pathway for the air from the balloon to escape, following Newton's Third Law: as the air pushes backward (action), the car will move forward (reaction).

Step 3: Make the Axels

Action:

Cut the paper straw into two equal pieces. These will be the axels for your car's wheels.
Insert each wooden skewer into a paper straw, making sure they are long enough to go through the width of the bottle.
Observation:

The axels (wooden skewers) are the central part of the car's wheels. They need to be aligned so that the wheels spin smoothly.
The axels need to be balanced, ensuring that the wheels can rotate freely when the car moves.

Step 4: Attach the Wheels

Action:

Take the four bottle caps and create holes in the center of each one. These will act as the car's wheels.
Slide the bottle caps onto the axels (the wooden skewers with the paper straw), one cap at each end of both skewers.
Tape the wheels securely to the skewers, ensuring they spin freely.

Observation:

The wheels will help the car roll smoothly.
Make sure the wheels can rotate easily, as this will affect how fast and far the car can travel.

Step 5: Attach the Balloon

Action:

Stretch the balloon over the neck of the plastic bottle.

Use the self-adhesive tape to secure the balloon at the opening of the bottle, ensuring no air escapes.

Observation:

The balloon acts as the source of air pressure. When inflated, it stores air that, once released, will push out through the straws and cause the car to move.
The balloon should be large enough to store air, but not too tight, so it doesn't pop.

Step 6: Test the Balloon-Powered Car

Action:

Inflate the balloon by blowing air into it before taping it onto the bottle.
Let go of the end of the balloon and watch the car move.

Observation:

As the air escapes from the balloon, it pushes out through the straws, and this backward motion pushes the car forward (Newton's Third Law of Motion).
The faster the air escapes, the faster the car should go.

Conclusion:

This demonstrates Newton's Third Law of Motion: the balloon pushes the air backward (action), and in response, the car moves forward (reaction).