Balloon Powered Car

Build a car and use air to make it move!

What You'll Explore

Students will build a simple car powered by air from a balloon. They will explore how air can push objects and cause motion.

Quick Facts

- **Science Area:** Physics – Force, Motion & Energy
- **Age Group:** 8–14 years
- **Time Needed:** 30–45 minutes
- **Difficulty:** Easy
- **Cost:** Low
- **Safety:** Adult supervision while using scissors or sharp objects

Goal

To find out how air pressure and force help a car move forward.

What You Need

Gather your materials before you begin!

- Balloon (1)
- Cardboard (car body)
- Bottle caps or toy wheels (4)
- Wooden skewers or straws (2) - for axles
- Drinking straw (1)
- Tape or glue
- Scissors

Build & Do

Step 1: Set Up the Car Body

What to do:

1. Cut a rectangular piece of cardboard (about 10 cm × 15 cm).
2. This will be your car body.
3. Make sure the edges are smooth.

Step 2: Attach the Wheels

What to do:

1. Take 2 wooden skewers or straws (these are your axles).
2. Push one skewer through 2 bottle caps to make a wheel set.
3. Repeat for the second set of wheels.
4. Tape both axles to the bottom of the cardboard.

5. Make sure wheels can spin freely.

Tip: Leave a small gap between the wheel and cardboard so wheels can rotate easily.

Step 3: Add the Balloon Engine

What to do

1. Tape a drinking straw on top of the car body.
2. Make sure the straw is straight and points toward the back.
3. Stretch the balloon opening over one end of the straw.
4. Use tape or a rubber band to seal it tightly. Make sure no air can escape from the connection.

Important: The balloon should be at the BACK of the car, and the straw should point BACKWARD.

Step 4: Launch Your Car!

What to do:

1. Blow air into the balloon through the straw.
2. Pinch the straw to keep air inside.
3. Place the car on a flat, smooth surface.
4. Let go and watch it zoom!

What Do You Notice?

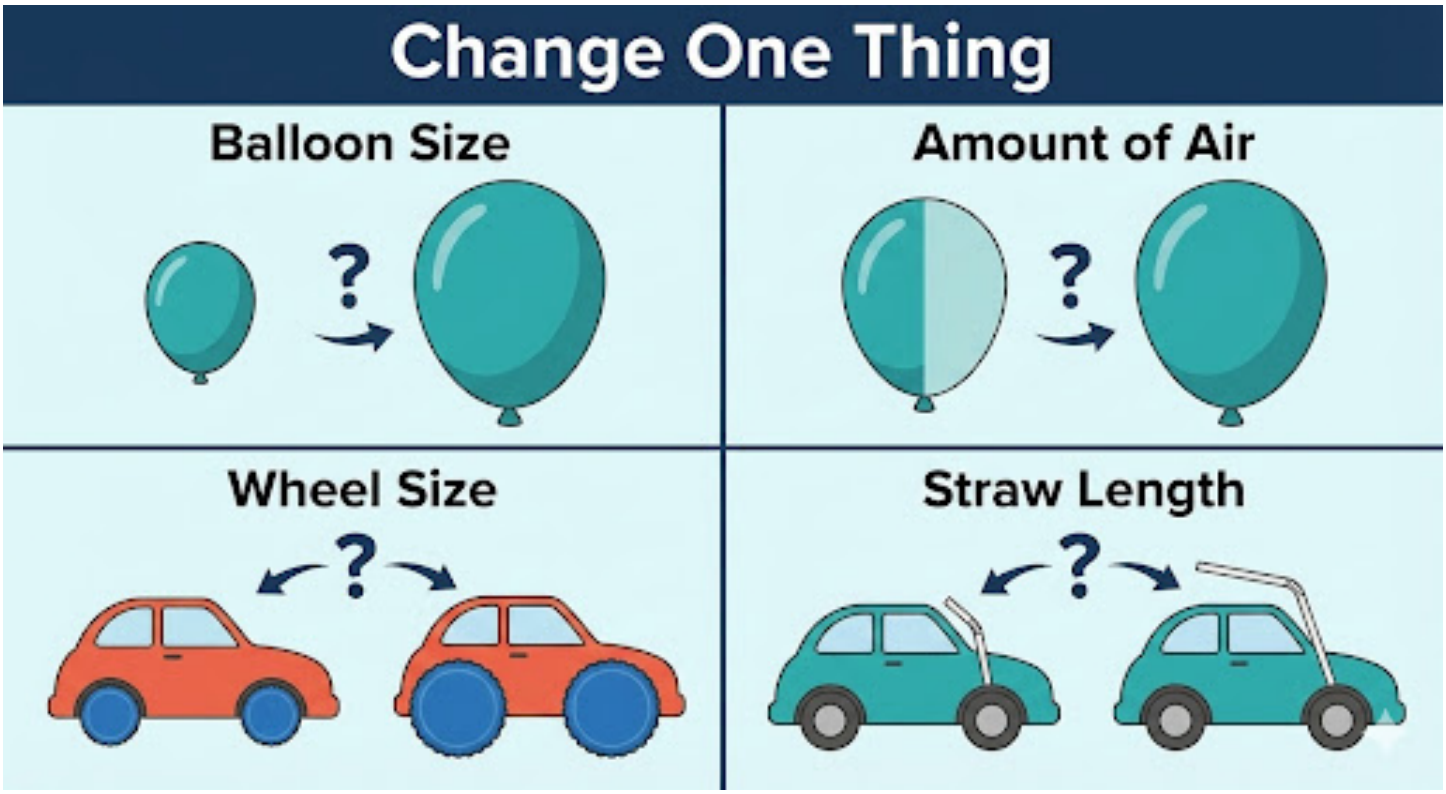
Observe and record:

1. How far does the car travel?
2. Does it move fast or slow?
3. What happens as the balloon becomes empty?
4. Does the car move in a straight line or curve?
5. What sound does it make?

Activity: Students may draw pictures, talk about observations, or write short notes.

Change One Thing

Try changing one of the following and test again.



- **Size of the balloon:** Try a small balloon vs. a large balloon. Which one makes the car go farther?
- **Amount of air in the balloon:** Fill the balloon halfway vs. completely. Compare the distances.
- **Size of the wheels:** Use bigger vs. smaller bottle caps. How does this affect speed
- **Length of the straw:** Try a longer vs. shorter straw. What difference does it make?
  Remember: Change only ONE thing at a time!

What's Going On?

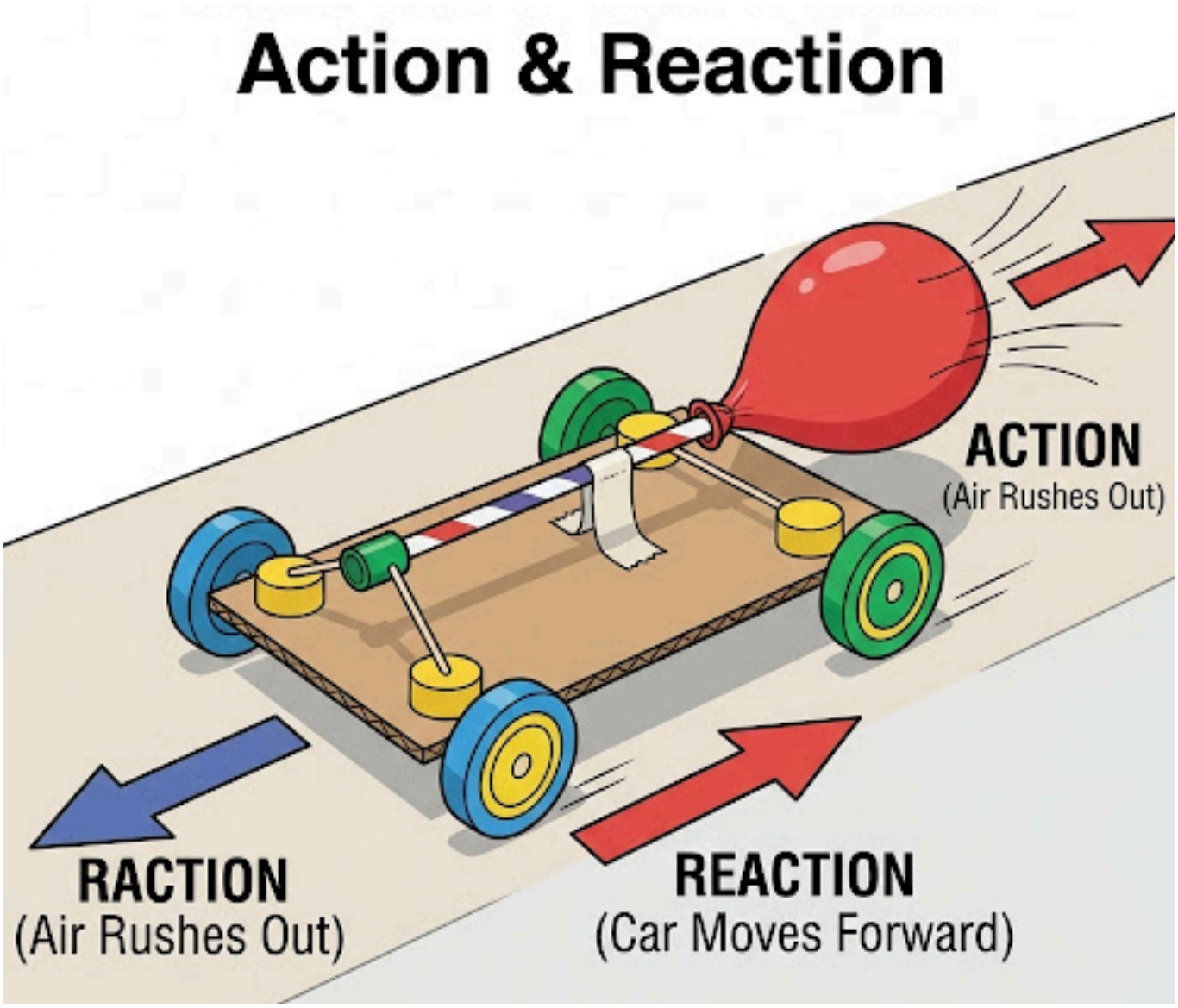
When air escapes from the balloon, it moves backward. This backward movement of air pushes the car forward. More air creates a stronger push, so the car moves farther. Think of it like this:

- The balloon is like a tiny jet engine
- Air rushing out = engine exhaust
- The push created = thrust (the force that moves things)

Theory Behind the Activity

Newton's Third Law of Motion

"For every action, there is an equal and opposite reaction."



In your car:

- **Action:** Air rushes out of the balloon backward ←
- Reaction: The car is pushed forward →
  Other examples: Swimming, Rocket, Walking

Potential Energy

When you blow air into the balloon, energy is stored in it. This stored energy is called potential energy. The stretched balloon walls hold this energy due to air pressure. Think of it like a stretched rubber band or a drawn bow.

Change of Energy

When the balloon is released:

Potential Energy (in stretched balloon) ➡ Air pressure builds ➡ Kinetic Energy (moving air) ➡ Air pushes backward ➡ Motion of the Car (car moves forward)

Some energy is also lost as:

- Sound (the whooshing noise)

- Heat (from friction)
- Friction between the wheels and the surface

Key Science Concept

The balloon-powered car shows how force, motion, and energy are connected.

- Stored energy can change into motion
- Forces always work in pairs (action-reaction)
- Energy transforms from one type to another
  Big Idea: Air can apply force, and stored energy can be changed into motion.

Take It Further

Try these experiments!

1. **Distance Challenge:** Mark distances on the floor and measure how far each design travels.
2. **Speed Race:** Set up a race track, time the cars, and calculate speed.
3. **Design Competition:** Challenge students to build the car that goes the farthest.
4. **Uphill Test:** Create a ramp and see if the car can climb uphill.
5. **Recycled Materials Challenge:** Build cars using only recycled materials.

Real-World Connection

This idea is used in many places!

- **Rockets:** Space rockets use the same principle.
- **Jet Engines:** Push air backward to move forward.
- **Air-Powered Machines:** Pneumatic tools and compressors.
- **Toys:** Air-powered toy rockets and launchers.

Skills You Used

- Observing
- Designing
- Experimenting
- Measuring
- Problem-solving
- Recording
- ✓Comparing

Curriculum Connections

- **India:** NEP 2020, CBSE (Force and Motion), ICSE (Laws of Motion)
- **International:** NGSS (Forces and Interactions), IB (PYP/MYP), Cambridge (Forces and Motion)

For Teachers

- **Before:** Test the car, gather materials, prepare recording sheets.
- **During:** Encourage repeated trials, ask open-ended questions, focus on observation.
- **After:** Discuss results, compare designs, connect to real-world examples.

Vocabulary

- **Force:** A push or pull that makes something move or stop.

- **Motion:** When something moves or changes position.
- **Air Pressure:** The push created by air molecules pressing on something.
- **Potential Energy:** Stored energy waiting to be used.
- **Kinetic Energy:** Energy of movement.
- **Thrust:** The force that pushes something forward.
- **Friction:** A force that slows things down when surfaces rub together.
- **Action-Reaction:** When one force happens, an equal force pushes back the opposite way.

Record Your Results

Trial	Distance (cm)
Trial 1	
Trial 2	
Trial 3	
Average Distance	

- **What I changed:** _____
- **What happened:** _____
- **Why I think this happened:** _____

Have fun building and experimenting! Remember: Real scientists try many times and learn from each test!