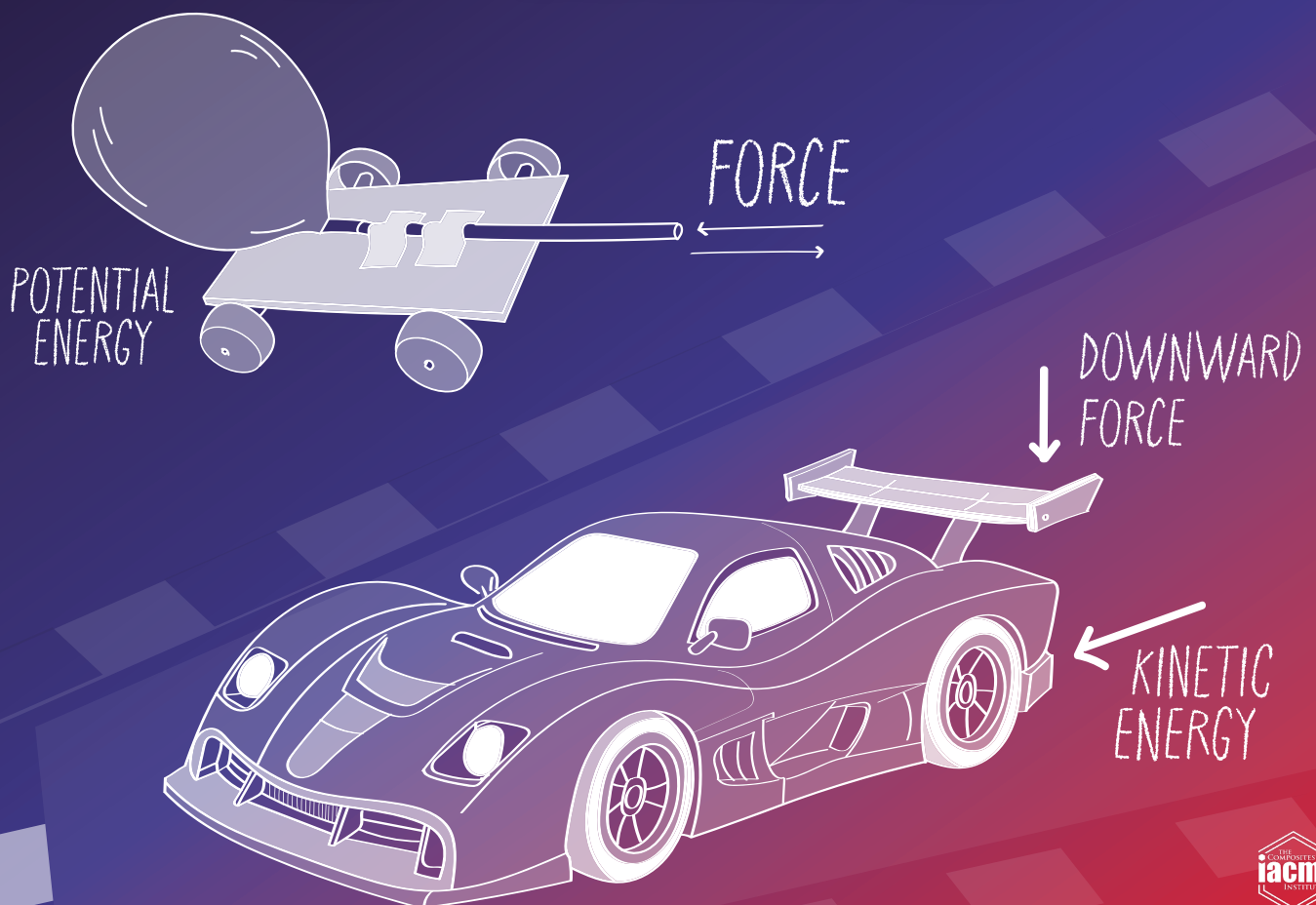


DREAM. BUILD. BECOME.

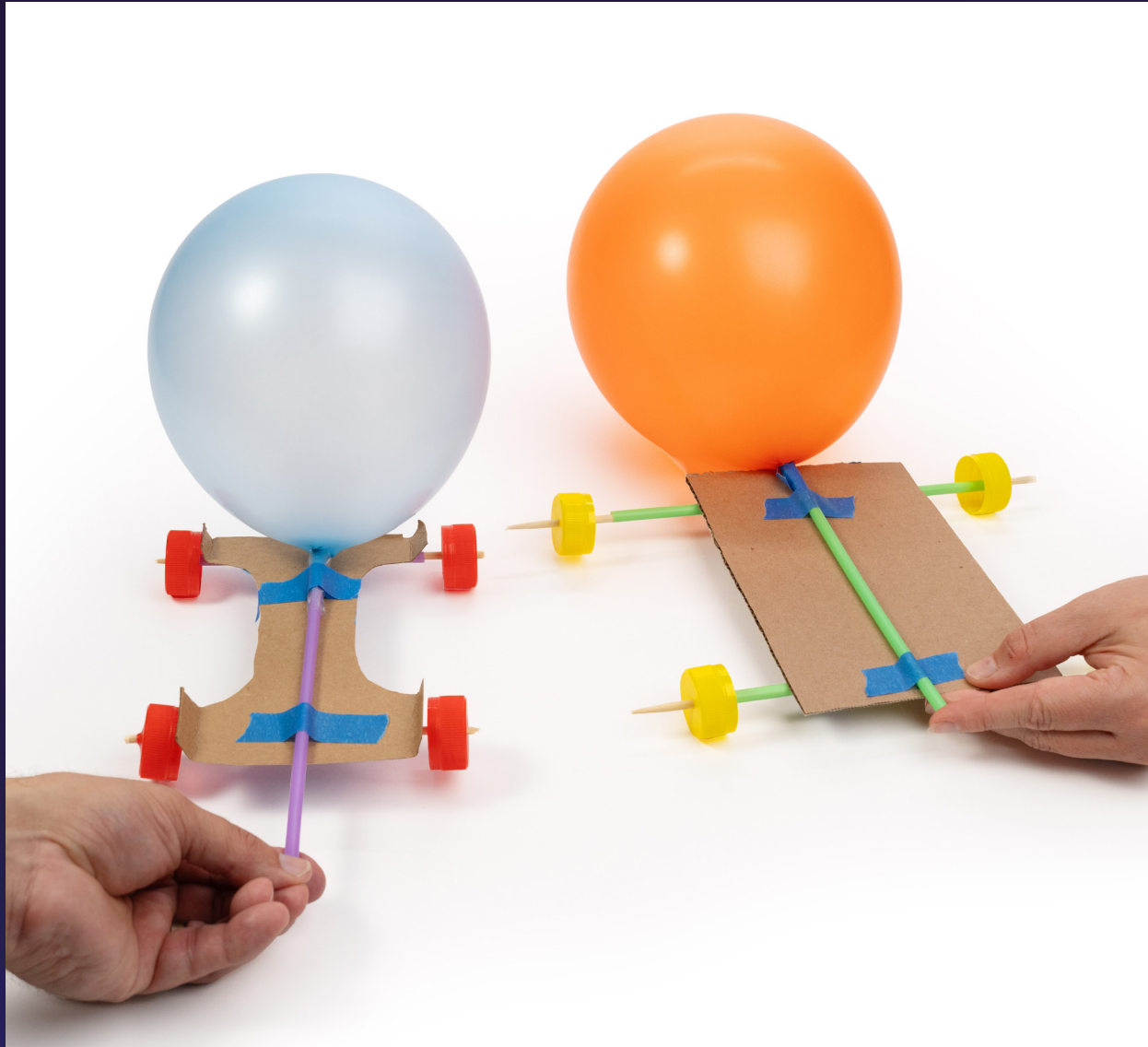
ACE METAL FOUNDATIONS

By IACMI

Air-Powered Car



Air-Powered Car



Prior Knowledge

In this activity, students will need to follow multi-step instructions. Students will also benefit from a basic understanding of cause and effect, and how simple tools like wheels assist with basic motion.

Air-Powered Car

Lesson Overview

In this activity, students build and test a simple air-powered car using everyday materials. As they explore how the car moves, the lesson emphasizes that motion does not happen on its own; something must cause an object to move.

Students observe that air released from a balloon can create a push that makes the car roll forward. Through building, testing, and making a small improvement, students begin to connect their actions to what happens, strengthening their understanding of cause and effect.

This activity connects to manufacturing and industry by showing how people test ideas before making products. In real factories, builders and designers use air, motion, and repeated testing to help machines and products work better. Students practice these same habits as they build, test, and improve their cars.

Vocabulary

Potential Energy: Energy that is stored and ready to be used. *The air inside the balloon is stored energy.*

Kinetic Energy: Energy of motion. *When your car is rolling, it is using kinetic energy.*

Force: A push or pull that makes something move. *The air escaping from a balloon creates a force.*

Straight: Lined up in a direct path. *Keeping parts straight helps your car move forward instead of turning.*



Figure 1: Potential energy stored in a race car before the race begins.



Figure 2: A race car using kinetic energy as it crosses the finish line.

Air-Powered Car

The Foundations of Motion and Energy

Motion doesn't happen by itself. Something has to cause an object to move. When air is blown into a balloon, the balloon is holding energy. This stored energy is called potential energy. The balloon is not moving yet, but it is ready to do something.

When the balloon is released, the air rushes out. As the car starts to roll, the energy changes into movement. Moving energy is called kinetic energy.

The air pushing out of the balloon gives the car a push that makes it move forward. How the car is built, such as keeping the wheels straight and able to spin, helps it use that movement to travel more smoothly.

People who design and build machines think carefully about how energy causes motion. They test ideas, make changes, and try again to help things work better. Building and testing an air-powered car uses the same kind of thinking that is used to make real-world products move.

Materials

Materials Supplied in Kit

Per Student

- 4 bottle caps
- 2 wooden skewers
- 3 straws
- 1 balloon

Shared

- Tape Rolls

Materials Supplied by Teacher

- Cardboard
- Flat testing surface

Recycled Material Note:

Students will use a piece of cardboard from home, such as a cereal box. Builders and manufacturers often use materials they already have to test ideas. This helps cut costs and reduce waste while still creating something that works. Materials should be clean and safe for classroom use. A note to send home is included in this workbook.

Air-Powered Car

Activity Directions

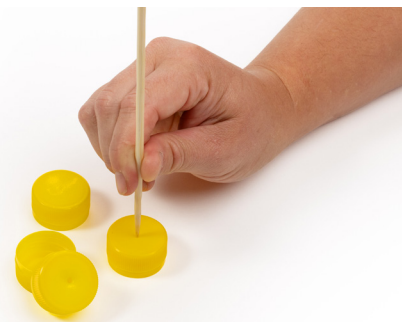


Step 1: Build the Body

- Cut a rectangle out of the cardboard. A general rule of thumb is a 5 inch by 7 inch rectangle, which is slightly larger than an index card.

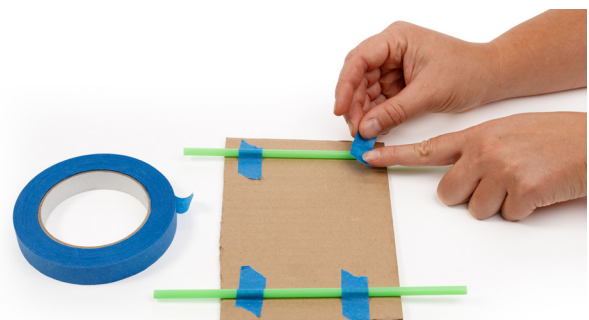
Step 2: Prepare the Wheels

- Place each of the 4 bottle caps on a table or hard surface with the smooth side up
- Use the pointed end of a skewer to prick a hole in the center of each cap
- Keep hands away from the tip of the skewer



Step 3: Prepare the axle housings

- Tape one straw across the front edge of the cardboard car body
- Tape a second straw across the back edge of the cardboard car body

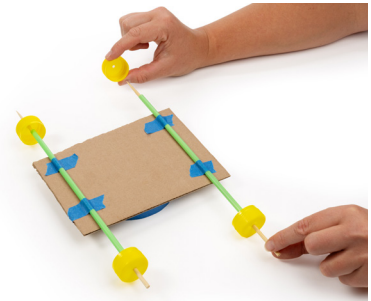


Air-Powered Car

Activity Directions Continued

Step 4: Create the Wheel and Axle Assemblies

- Push one bottle cap onto each bamboo skewer
- Insert the free end of each skewer through each of the straw axle housings
- Push a second bottle cap onto the opposite end of each skewer to complete the wheel and axle assemblies



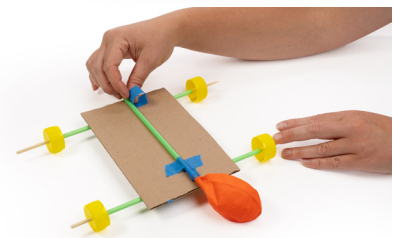
Step 5: Prepare the Balloon

- Use scissors to cut off the rolled opening at the end of the balloon



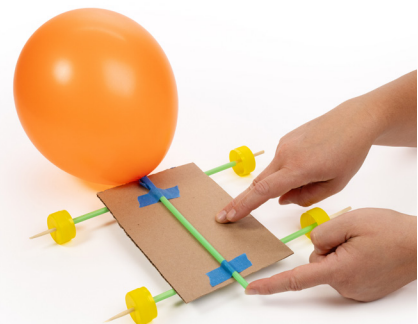
Step 6: Prepare the Engine

- Insert the third straw into the opening of the balloon
- Using duct tape or masking tape, tightly wrap the balloon opening and straw to create an airtight seal
- Tape the straw to the top face of the car so that the deflated balloon does not make contact with the surface below



Step 7: Test the Car

- Inflate the balloon by blowing through the straw
- Pinch the opening of the balloon shut, or place a finger over the opening of the straw to prevent air loss
- Place the car on the floor and release to test



Step 8: Modify as Needed

Air-Powered Car

Discussion Prompts or Reflection

- What gave your car the energy to move?
- What did you notice when the air rushed out of the balloon?
- Did your car move straight? Why or why not?
- Did you make any changes to your car that made it move better?

Variations and Enrichment

- This activity can be enhanced by challenging the students to customize the shape of their cars.
- Enrichment can be added to this activity by challenging the students to measure how far their car went, or how much farther one car traveled than another.
- Students can work in pairs or small groups to improve upon one car design, discussing what worked, and what did not.

Foundation Exploration

- **Car engineers** design and test cars to help them move safely and smoothly. They think about how stored energy can turn into motion.
- A **mechanical engineer** builds machines with parts that move, like wheels and axles. They use energy to help machines roll, spin, or move faster.
- **Toy designers** create toys that move using air, springs, pushes, or pulls. They test how stored energy can make toys zoom or roll across the floor.
- **Race car technicians** help cars go fast by checking the wheels and axles. They understand how energy and motion work together to make a car as fast as possible.