Grades 3–5
Journey to Invention
Balloon-Powered Taxi

Enter this engineering design challenge to make a balloon powered taxi! We will learn about energy and opposing forces through the City's famed transportation vehicles.

What Will You Learn?:

- Newton’s Third Law of Motion
- Potential and kinetic energy
- Opposing forces

Materials:

- Taxi template
- Cardboard
- Wheels
- Dowels/skewers
- Erasers
- Straight straw
- Bendy straw
- Balloon
- Scissors
- Tape or glue
- Crayons

Instructions:

1. Cut out and decorate the taxi template. Tape it together.
2. Make the car base:
a. Cut each straw in half. The straws will hold the skewers as your axles.
b. Tape the first ½ straw down to the short end of the cardboard rectangle. Repeat on the other end of the cardboard. Make sure the straws are spaced far enough apart and straight so that the wheels will roll.
c. Then take a skewer and pierce a hole through the center of each eraser. Make sure you stick it in the center. Be careful not to poke yourself!
d. Cut the pointy tip off of your skewers and cut them in half.
e. Pass the skewer half through an eraser, thread the wheel on, then pass it through the straw. Add the 2nd wheel on the other side, and the final eraser. Repeat this step for the other 3 axles.
f. Test the car to make sure the wheels are spinning freely. The wheels should be on not too loose or too tight.

3. Tape the balloon onto the short end of the bendy straw. Do not blow up the balloon beforehand because the tape won't stick to it. Try to tape it so that no air can escape.

4. Tape the long end of the bendy straw onto the car base. Make sure that the end of the straw is hanging off of the end of the car base, so that you can blow into it.

5. Tape the paper taxi onto the cardboard rectangle over the balloon straw

6. Blow into the straw to inflate the balloon. Then pinch the end of the balloon so that it stays inflated.

7. Place the car onto a flat surface and then release the balloon. Watch as the car flies forward!
Reflection Questions:

- Which direction did your taxi go?
- How could you make it go the other direction if you wanted to?
- Do you think this would be a good way to propel real vehicles? Why or why not?

Explanation:

- Newton's third law of motion states that for every action, there is an equal and opposite reaction. In the case of a balloon-powered taxi, the action is the air escaping from the balloon, and the reaction is the forward propulsion of the taxi. When the balloon is inflated, it stores potential energy in the form of the compressed air. As the air is released from the balloon, the potential energy is converted into kinetic energy, which is the energy of motion. This kinetic energy propels the taxi forward.
- For younger kids, the taxi template can be premade and wheels can be prepared in advance. A balloon inflator can also be used. For older kids, they can experiment with the type of vehicle they design, as well as the speed and direction the car travels.

Further Reading Recommendations:

Energy
Movers
Energy

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