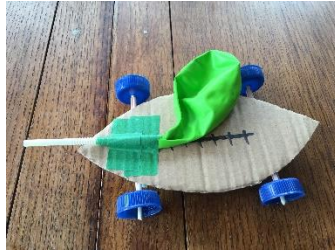


Elementary Trades and ADST Projects at Home



Project: Balloon Cars

Time required: 30 minutes to 1 hour

Theme: Simple machines, STEM, ADST, Physics

This activity can be used to introduce the Physics concepts of Kinetic Energy, Potential Energy, Conservation of Energy, and Newton's Laws of Motion.

<https://www.ducksters.com/science/physics/>

Balloon cars can also be used as a fun lead up to the Skills Canada Gravity Vehicle Challenge; <http://skillsbc.ca/PDFProvincialScope2013/JrGravityCar13.pdf> and was modified from

<https://www.scientificamerican.com/article/build-a-balloon-powered-car/> ,

https://www.rigb.org/docs/ballooncarracers_infosheet_1_1.pdf, and

<https://www.wikihow.com/Make-a-Balloon-Car>

Grades: K-3 with assistance, 4-7 individually or small groups

Tools and Materials:

- Cardboard (car body)
- 2 straws (axle housing and balloon valve)
- 2 Wood/bamboo skewers (axles)
- 4 plastic bottle caps (wheels)
- Balloon
- Tape
- Scissors
- Pliers
- Hammer and 2 ¼" common nail
- Safety glasses
- ❖ (an adult should use or supervise use of these tools depending on age and skill level of the participating student)

Procedure:

1. Gather your materials.



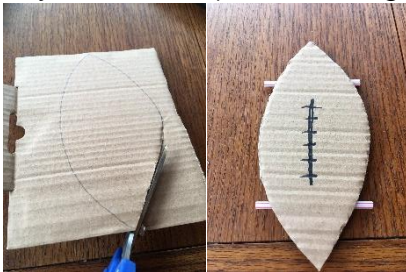
2. Prepare your axle housing by cutting one straw in half. Use only the straight portion if you are using bendable straws.



3. Prepare your wheels by making a small hole in the center of each bottle cap. With the help of an adult, use the pliers to hold each cap while hammering your 2 1/4" nail, to make a small hole for the skewer to fit through. Extreme care must be taken during this step to avoid injury and safety glasses are recommended when using a hammer and nail.



4. Prepare your car body by creatively cutting and decorating your cardboard to fit your straws (axle housings). Your car body should be narrower than the length of your straws (axle housings) so your wheels will clear your car body.



5. Tape your straws (axle housings) to the underside of your car body and ensure they are perpendicular to the body of the car.



6. Fit your wheels to your axles by carefully inserting a pointed skewer into one cap (wheel) and sliding the cap to the blunt end. Ensure hands are clear as the pointed end of the skewer is pushed through.



7. Next, insert your skewer (axle) through one of your straws (axle housing) and carefully add the second wheel to the axle.



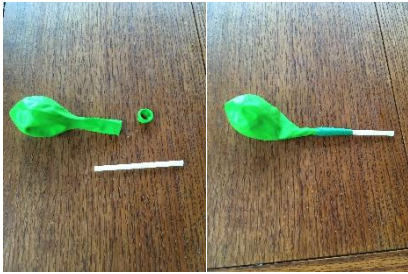
You can adjust the position of the wheels for clearance before cutting off the extra pointed end of the skewer carefully with your scissors.

Carefully scoring the skewer and breaking it is easier with bamboo skewers.

Repeat this procedure to assemble your other axle and wheels.



8. Insert part of the remaining straw into the balloon and add tape to seal the connection.



Cutting the rib off the balloon makes it far easier to tape to the straw.

9. Mount the balloon to your car and secure with tape. The straw and balloon opening should face the rear of your car.



10. Your balloon car is now ready for experimentation! Blow air through the straw and into the balloon by pinching the straw between breaths. Aim in the direction you would like to see your car travel and release the straw when ready to launch. Your balloon car will work better on a hard, flat surface like a wood floor and will have difficulty running on carpet. Adjusting the direction of your straw, if using a bendable straw, can greatly influence the performance of your balloon car.



Troubleshooting:

- If your balloon is leaking air, check the connection between the straw and the balloon and add tape if necessary. If the balloon itself is leaking air you may need to replace the balloon with a new one.
- If your wheels are not turning properly, check to ensure you have a little space between the wheels and the car body as well as between the wheels and axle housing. Adjust by sliding apart if necessary.
- If your car is turning as it travels, check to ensure the axle housings are perpendicular to the car body and add tape if necessary.

- If your straw is hanging out too far and rubbing on the surface of the floor, you may trim the straw or adjust it up and secure with tape to prevent friction.

Extensions:

- Experiment with larger or smaller wheels. What works best?
- Add more balloons for more power.
- Build another balloon car and challenge family members to a race.
- Research different types of balloon cars and build others to determine the best design. Why do some balloon cars work better than others?

Reflection Questions:

- Why does the car go forward if the balloon is blowing backwards?
- Do you think the size of the wheels will affect how fast it goes?
- Do you think the size of the wheels will affect how far it goes?
- What can we change about the design to make a better car?
- What do we mean by a 'better' car?
- How can we measure how far the car goes?
- How can we find out how fast the car goes?

https://www.rigb.org/docs/ballooncarracers_infosheet_1_1.pdf

Assessment:

Discuss reflection questions and visit <https://www.ducksters.com/science/physics/> to evaluate the physics concepts involved with your balloon car. Research the Physics concepts of Kinetic Energy, Potential Energy, Conservation of Energy, and Newton's Laws of Motion to explore the relationships between your Balloon Car and the physics involved.

https://en.wikipedia.org/wiki/List_of_physics_concepts_in_primary_and_secondary_education_curricula#Motion_and_forces

- What other physics concepts can be explained by demonstration with your balloon car?

Resources and Links:

<http://skillsbc.ca/PDFProvincialScope2013/JrGravityCar13.pdf> (gravity vehicle challenge)

<https://www.scientificamerican.com/article/build-a-balloon-powered-car/> (balloon car lesson)

<https://www.wikihow.com/Make-a-Balloon-Car> (balloon car lesson)

https://www.rigb.org/docs/ballooncarracers_infosheet_1_1.pdf (balloon car lesson)

<https://www.ducksters.com/science/physics/> (Physics for children)

https://en.wikipedia.org/wiki/List_of_physics_concepts_in_primary_and_secondary_education_curricula#Motion_and_forces (Physics for children)