

## Balloon Car Race Activity

### Group Materials:

- Lego, cardboard, or other materials, make sure you have wheels
- Balloons all the same type, from the teacher
- Piece of string 80 cm long
- Bent straw

### Instructions:

1. Build your car and include an area at the back where the mouth of a balloon could be secured. This may be a hole in a piece of cardboard, big enough to get the straw into the mouth of the balloon.
2. All balloons should be of the same type and should be blown up to the same circumference before racing. The string should be used to measure and control the circumference.
3. Test your balloon racing car and make adjustments. Indicate any major changes on your original drawing.

Now, students will all race their cars. Two people should blow up the balloon, check the circumference, and hold the car at the starting line.

One person should time the car or use the Video Physics app on an Ipad or other tablet to videotape and graph the trajectory. There may be up to three winning cars – the fastest, the furthest, and the most stylish. Now, with your team, you will analyze your car's motion.

### Balloon Car Analysis

- A. Create a free-body diagram of your car as it is in motion.
- B. Using the displacement of your car and a measurement or estimate of the initial velocity, calculate its acceleration using the equation(s) for uniform acceleration.
- C. Use the graphing information from the Video Physics App to calculate the acceleration again.
- D. Compare these two numbers. Does this acceleration seem reasonable? What sources of error may have been introduced into your experimental measurements?

E. Now, using Newton's Second Law, calculate the force of friction acting on the car.

F. Which of Newton's Laws is at play in the car's motion? Describe how this law applies to the movement of the car.

Note: Submit your car design, revisions, and analysis to your teacher for assessment.