

# Week 1: On Your Mark, Get Set, Blow!

Make your own breeze on a hot day and learn about Newton's third law of motion at the same time. Build balloon racers and explore the idea that for every action, there is an equal and opposite reaction. Challenge someone to a race, experiment with different types of balloons, even make your racer into a Chicago "L" car!

## Experiment

# BALLOON RACERS

### Materials

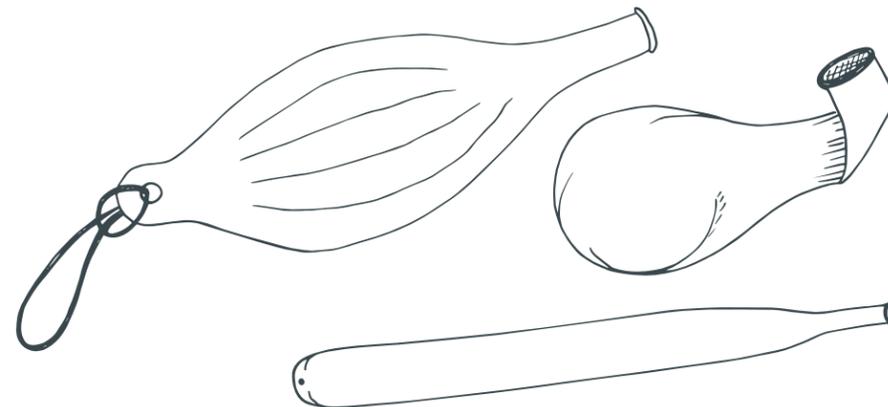
- String
- Balloons (long, skinny ones work best)
- Straw
- Tape
- Binder clip
- Scissors 
- Chicago "L" car template (available at [msichicago.org/summerbrain](http://msichicago.org/summerbrain))
- Crayons or markers
- Popsicle stick
- Lightweight basket, like for cherry tomatoes or berries (optional)
- Small toys or figurines (optional)

### Instructions

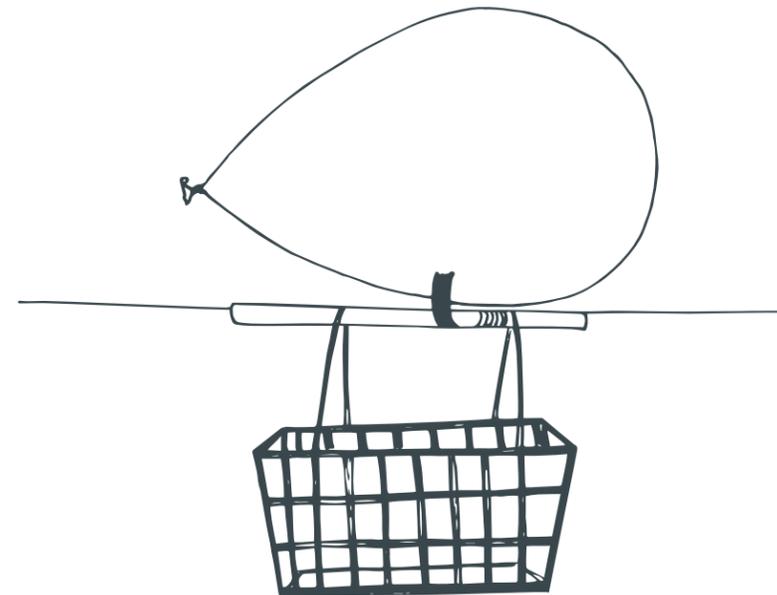
Cut a long piece of string (at least 8 feet), tape one end to a wall and thread a straw on the string.



Blow up a balloon, close the end with a binder clip or clothespin, and tape it to the straw so that the neck of the balloon points in the opposite direction the balloon will travel. Hold the string so it's parallel to the floor, or even tape the other end to another wall. Position the balloon racer at the end, remove the clip and watch it go!



Turn your racer into a Chicago "L" car by downloading our template, cutting it out and decorating it. Print it on cardstock or tape it together with a popsicle stick in the middle for support, then tape it to the straw above the balloon. Set up two string "racetracks" next to each other and challenge someone to a race! Experiment with different balloons, or try making the racer go up a steep incline.



### What's happening?

As air rushes backwards out of the balloon, it pushes the racer in the opposite direction with the same amount of force. This is Newton's third law of motion at work—for every action, there is an equal and opposite reaction.

### Game on!

Turn your racer into a blimp by hanging a lightweight basket, like one used for cherry tomatoes or berries, from the straw so that the balloon is positioned on top. Add some passengers to your basket and take them for a ride!

### Tips

Tape the balloon onto the straw in just one place. The balloon shrinks as it loses air, which can pull off the tape.

### More Ways to Play With Racers

See some of the fastest vehicles in history at MSI, including the Spirit of America, a land vehicle that traveled more than 539 miles per hour!

### Like this activity? You could be a ...

- Mechanical Engineer
- Aerospace Engineer
- Rail Engineer
- Materials Scientist

# summer BRAIN GAMES



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## Balloon Racer "L" Car

Decorate your "L" car. Fold between the two cars (so your train is double sided) and on the dotted line to create a triangle, using the excess paper on the bottom as a flat base. Tape the base together, and tape the "L" car to the straw of your balloon racer.

fold here -----

