



Project Exploration creates transformative learning opportunities for youth underrepresented in the sciences –particularly students of color and girls – by equipping them with the skills, practices, and mindset needed for a lifelong pursuit of learning. STEM@Home makes activities around science, technology, engineering, and math accessible and fun to do at home. This STEMbook activity, resources, and more are available at www.projectexploration.org/stemathome.

In this activity, you will:

learn about convection heat transfer and see how it can help "ghosts" fly!



Supplies Required:

- Tazo brand tea bags
- Scissors
- Sharpie
- Lighter
- Pie pan, or other plate that can get hot

Video

What is convection heat transfer? <https://tinyurl.com/k8l8r29>

Overview

There are three different forces at work that allow the tea bag ghost to fly. First, as the cylindrical tea bag burns down, the air inside the bag heats up. When air heats up, it becomes less dense. And when air becomes less dense, it rises. So, as the air inside the cylinder becomes warmer and less dense than the air outside the cylinder, it rises. Second, as we've established, the hot air inside the burning cylinder will rise as it becomes less dense than the cool air outside the cylinder. As the hot air rises, cool air rushes in to take its place, creating a convection current. In this case, the convection current pushes upwards from the bottom of the bag. Finally, as the tea bag burns the smoke rises and leaves behind a very delicate and very lightweight frame of ash. The ash framework is so lightweight that it is easily carried into the air by the hot rising air and convection current.



Instructions

1. This experiment contains the use of fire. DO NOT do this experiment in an enclosed space.
2. Start by cutting the top off of the tea bag. Try to make as straight a cut as possible. Throw the top away.
3. Empty all the tea out of the bag. Then, unfold the bag and lay it flat.
4. Draw a ghost face on your tea bag.
5. Then open up the tea bag to make it into a hollow cylinder. Stand it on a non-flammable surface.
6. At this point, you need to make sure your flying tea bag ghost is in a safe location, FAR AWAY from anything that could catch on fire. They fly higher than expected!
7. Now for the fun part. Use a lighter to light the top of the tea bag ghost on fire.
8. The fire will quickly burn down the ghost, and just before it reaches the bottom of the bag, your ghost will lift off.

Additional Resources

Think About It! How does this relate to a hot air balloon? What would happen if there was a hole in the tea bag? Why does the tea bag fly upwards?

1. See the experiment in action: <https://tinyurl.com/y29dddmx>
2. How do hot air balloons work? <https://tinyurl.com/yykhmc3e>

Share It Out

Share on social media: Take a video of your ghost and explain how it flies! Share on social media with your family and friends, using the hashtags:

#HalloweenScience
#ProjectExploration
#StemAtHome

For more activities like this one, go to www.projectexploration.org/stemhome. If you're interested in learning more about Project Exploration and our free events, programs, and activities, please complete our interest form and a staff member will be in touch with you: www.projectexploration.org/interest.

