Activity: Hot Air Balloons

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This activity is designed to get students thinking about how some flying objects overcome gravity through buoyancy.

Materials:

-Tape

-Small plastic bag

-Large garbage bag

-Hairdryer

Before experimenting, we want to activate what the student already knows about buoyancy. They have likely experienced it before, they just didn’t have a name for it! Pose these questions: “Have you ever tried to swim to the bottom of a swimming pool?”, “Did you have a hard time reaching the bottom because you felt like you were getting pushed back up?”

* Explain that this force is called buoyancy. When you enter the water at the pool, you displace the water, meaning you push the water aside to make room for your body. The water exerts the same upward force on you that it did on the water you displaced, which is why you feel pushed up. If the force of buoyancy is stronger than the force of gravity, you will rise to the surface, like floating! Some flying objects, like hot air balloons, work the same way!
* Ask the student “What happens to air when it is heated?” They should know that warm air rises. If they don’t, this experiment will help them understand.

Experiment:

* Tape the opening of a small plastic bag so it is the same size as the end of the hair dryer (watch video from link above if this is not possible for you). Don’t tape the bag directly to the hairdryer as it will be hard to get off. Let the bag fill up with hot air (wait a bit after it is filled up completely to make sure the air is nice and hot). Release the bag and watch it float up!
* Ask, “What made the balloon float up?” Explain that when the air is heated, the air particles inside the bag start colliding faster and the air expands, taking up more room. It displaces the air that was there before. Since the bag is lighter that the air it displaced, the pressure of the air causes it to rise. This is how hot air balloons work.
* Try this with a large garbage bag. Ask, “What do you think the difference will be with the larger bag? Will it rise more? Why or why not?” Let them test it!