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Warm Air Rises

Description

Warm air can move things. Explore the principle of buoyancy with us, build a moving air snake and make a bag rocket rise. In this video, elementary school children and kindergarteners learn that warm air rises. In elementary school and kindergarten, children can replicate this experiment under adult guidance and supervision, because experimenting with air is really fun. Warm air rises because it has a lower density than cold air. It is therefore lighter than the heavy cold air. This is where children discover the principle of buoyancy.

Materials

1. Paper
2. Pencils
3. Possibly a template of a paper streamer
4. Scissors
5. Thread
6. Tape
7. Tea lights and/or other heat source
8. Matches
9. Toaster
10. Garbage bag with a drawstring

Procedure

1. You know those beautiful Christmas pyramids that start spinning when you light the candles underneath and stop again as soon as you extinguish the candles? Why do you think that is? Might the movement have something to do with the candles?
2. You'll have to find out! Make a paper spiral for this purpose. Draw a spiral on the paper or use the template with the streamers. If you like, you can paint your spiral. Then cut it out and attach the thread to its tip with the adhesive tape.
3. Now hold the spiral carefully (fire hazard) about 20 cm away from the flame over a lit tea light. The spiral starts to rotate. Hold the spiral next to the candle. It comes to a standstill. Test the spiral over a radiator. Again, the spiral starts to spin. So it is clearly the warm air that rises and sets the spiral in motion!
4. You can now use the fact that warm air rises for another experiment: Carefully hold a garbage bag over a toaster that you have started at maximum power (only do this with adults – fire hazard). After a short time, the bag will inflate and eventually float upwards towards the ceiling like a hot air balloon. There it will dwell for a short time and then slowly sink to the ground again.

Background

Air consists of many small particles, the air molecules. When the air heats up, these particles move more strongly, increasing the distance between them. This makes the warm air lighter than the cold air, since there are more air particles in the same space, and it rises or is simply displaced upward by the cold air. This is also called buoyancy. In the experiment, the warm air above the candle is lighter than the ambient air, creating a rising air current that causes the spiral to rotate.

This is exactly how a large hot air balloon or our garbage bag flyer works. The warm air heated by the toaster or burner expands. Some air escapes downward through the opening. The residual air in the bag/balloon is now lighter than the ambient air and is pushed upwards by it. The balloon and also our garbage bag begin to rise.