Properties of Air	Grade 6 Flight

Lesson Plan

Safety Notes

Have an adult help you with the sharp tool needed to put a hole in one of the bottles!

Description

Do you know what air is made of? Why does it act the way it does? Explore some of the properties of air as you try and blow up a balloon in a bottle and build your own balloon rocket!

Materials

Balloon in a Bottle

- 1-2 balloons
- 1-2 empty plastic pop/juice bottles
- Push pin, thumb-tack, or nail

Balloon Rockets

- 1-2 balloons
- 1-2 plastic/paper drinking straws
- Scissors
- String, rope, or thread (small enough to thread through straws), for best results try to find something at least 1m long
- Tape

Science Background

Air is all around us but how do you know it is there? We can't see it, but air is made up of tiny particles of matter called molecules and atoms. Since air is made up of these tiny particles of matter, it has mass and that mass takes up space. Have you ever tried squishing a sealed bag of air? You might be able to squish it a little bit but not very much. This is because even though it might look empty, the air inside it is taking up space.

Particles of air can exert pressure. In fact, the particles of air that are all around us are always putting pressure on our bodies pushing inwards and the air inside our bodies is always putting pressure on our bodies pushing outwards. This balance of pressures is one of the things that helps our bodies keep their shape.

Activity Procedure

Balloon in a Bottle

1. Stretch the mouth of a balloon over the mouth of an empty plastic pop or juice bottle, with the body of the balloon inside the bottle
2. Holding the mouth of the balloon so that it doesn't slip off the bottle, try and blow it up inside the bottle. Can you do it?
3. Take the other empty bottle (or the same one if you only have one) and with the help of an adult, use the push pin, thumb tack, or nail to poke a small hole a centimeter or two wide in the side of the bottle
4. Repeat steps 1 and 2 with this new bottle. Was it easier or harder to blow up the balloon? Why do you think that is? What happens if you make the hole in the side bigger?

Balloon Rockets

1. Tie one end of the long string, rope or thread to a door handle, chair, or other sturdy object
2. Cut two 4-5cm segments of straw and thread them onto the string
3. Pull the string tight and tie it to another chair/sturdy object, or have someone hold it tight for you, the tighter you tie or hold the string the better your results will be
4. Blow up a balloon (don't tie the end) and tape it to the two pieces of straw on the string to create your rocket. Make sure you leave some space between the two pieces of straw, this will help your rocket fly straight
5. Slide your rocket along the string so that the mouth of the balloon is close to the end of the string and then let go. What happens?
6. Extend this activity by exploring how changing the amount of air in the balloon changes things. If you have different shapes of balloon test how different shapes travel. You can also set up two rocket tracks side-by-side and have races!

Debrief

Did you notice that it was very hard or impossible to blow up the balloon inside the bottle if there wasn't a hole in the bottle? This is because even though the bottle may look empty it is actually full of air particles that take up space. Without a hole in the bottle there is nowhere for those particles to go and as a result not much space in the bottle for the balloon to expand into as you try to fill it with more air particles that also take up space. When you add a hole to the side of the bottle the air inside the bottle can be pushed out the hole to make space for the balloon to expand as you force new air into the bottle inside the balloon.

As you inflated the balloon for your rocket you probably noticed it got bigger- that again is because the air particles that you are blowing into it take up space. Those air particles are putting pressure on the inside of the balloon, pushing outwards and causing the balloon to stretch and grow. The balloon fights against this pressure because it is being stretched and pushes back inwards. As long as you hold the mouth of the balloon the air inside has nowhere to go so your balloon will stay inflated. Once you let go of the mouth of the balloon the inwards pressure of the balloon forces the air inside the balloon out so that it can shrink. Since the air is being forced out of a small hole, it pushes back on the balloon enough to send it shooting across the rocket track (string).