

Buzzing balloon

Materials

- Balloon
- 50 cent coin
- Balloon pump

Instructions

1. Push the 50 cent coin in to the balloon by squeezing it down through the neck of the balloon. Be careful not to put a hole in the balloon.
2. Use the balloon pump to inflate the balloon.
3. Tie off the neck of the balloon.
4. Use one hand to hold the balloon and swirl it around until the coin is rolling around the inside of the balloon in circles. You should hear a peculiar buzzing sound. Holding the balloon up to a light or window can allow you to see the coin more easily.
5. Swirl the balloon faster to make the coin move faster. Does the sound change?



What happens?

Sounds are caused by vibrations. As the 50 cent coin rolls around inside the balloon, it causes the balloon to vibrate. When the rubber of the balloon vibrates, air inside the balloon vibrates and the air around the balloon vibrates. The balloon acts like a resonator to make the sound louder.

A 50 cent coin makes a much louder sound than a 10 cent coin would because of the shape of the coin. The 50 cent coin has 12 straight sides and 12 angles (it is a dodecagon) that bump against the rubber of the balloon as the coin rolls around to make a fairly loud sound. A 10 cent coin is almost perfectly round, with only very small ridges around its edge, so it rolls smoothly around the inside of the balloon and makes a quiet sound.

When the balloon is swirled faster, the coin rolls faster and the vibrations in and around the balloon are faster. As the vibrations became faster, the sound gets higher because fast vibrations make high sounds and slower vibrations make lower sounds.

Why does it matter?

The 'pitch' of a sound in music describes the highness or lowness of a note. In a high instrument like a small flute (e.g. piccolo), the vibrations that make the sound are very fast. The air inside the instrument moves back and forth very quickly and we get a high sound. In a lower instrument such as a large horn (e.g. tuba), the vibrations that make the sound are slower, and the air inside the instrument moves back and forth more slowly than does the vibrating air in a small flute.

Even though the vibrations in a low-sounding instrument are slower than in a high instrument, the air is still moving backwards and forwards at least 20 times in every second (20 Hertz). This is the lowest 'frequency' of sound that human ears can hear. The highest frequency humans can hear is around 20,000 Hertz.

Related activities

Experiment with different coins or other objects that will roll around inside a balloon. Hexagonal nuts work well.

Try using balloons to make a range of sounds:

- Inflate a balloon and squeeze the air out through the neck to make a funny sound. Try stretching the neck in different ways to change how high or low it sounds.
- Listen to the sound of a balloon popping.
- Rub the side of a balloon.
- Rub two balloons together.

Health and safety considerations

- Children or adults with latex allergies
- Children with a fear of balloons and/or loud noises
- Choking hazards for young children (coins, nuts and pieces of burst balloon)