

DREAM. BUILD. BECOME.

ACE METAL
FOUNDATIONS

By IACMI

Getting the Point



Getting the Point



Prior Knowledge

Students should be able to hold and manipulate objects carefully, follow simple step-by-step directions, and follow basic classroom safety expectations.

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Lesson Overview

In this lesson, students explore how stretchy materials behave when force is applied. Using balloons as a familiar material, students investigate how pulling, poking, and stretching can lead to different outcomes depending on where and how the force is applied.

Students observe that balloons can stretch a lot without popping when force is applied slowly and carefully in certain areas, while the same balloon may pop quickly when force is applied suddenly or in thinner areas. Through this hands-on experience, students begin to understand that materials are not the same everywhere and that materials respond differently based on how they are used.

Rather than focusing on what balloons are made of, this activity emphasizes testing and observing material behavior. Students make predictions, try an action, and then observe what happens. When balloons do not pop as expected, students are encouraged to notice what they did differently and how the material responded. This supports early cause-and-effect reasoning and helps students understand that outcomes can change when actions change.

Vocabulary

Stretch: To pull something longer without breaking it

Force: A push or a pull

Slippery: Easy to slide across without sticking

Test: To try something and see what happens



Figure 1: A balloon can stretch because it is made of an elastic material that expands when air is added.

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The Foundations of Stretchy Materials

Some materials can stretch, and some materials cannot. A balloon is a stretchy material. When air goes inside a balloon, the balloon stretches to make room.

When we poke a balloon with something sharp, it usually pops. That's because the balloon is pulled very tightly, and the material can tear easily when it is tight.

But today, we are going to test what happens when we help the balloon stretch instead of tearing.

The balloon you are using has thicker and thinner parts. Some places stretch more easily than others. We will use a wooden skewer to gently poke the balloon in places where it can stretch the most.

We will also use soap. Soap makes things slippery. When something is slippery, it can slide instead of grabbing and tearing. The soap helps the skewer slide through the balloon while the balloon stretches around it.

Today, you will test how stretchy material behaves when you push slowly, carefully, and in the right place. You will watch what happens when the material stretches instead of breaking.

People who build and design things test materials like this to learn how strong they are and how they behave. By stretching, poking, and watching closely, you are learning how materials respond to what you do.



Figure 2: Latex is obtained from a rubber tree.



Figure 3: Balloons, made from latex, polymer and coagulant.

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Materials

Materials Supplied in Kit

Per Student

- 1 wooden skewer
- 1 balloon (up to three per student supplied in case of accidental failure)

Shared

- Dish soap
- (Optional) Balloon pump



Activity Directions

Step 1: Prepare the Balloon

- Choose one balloon
- Carefully inflate the balloon. Do not overfill it.
 - A good check: you should still see a small dark spot at the top of the balloon when inflated.
 - *Teacher note: An over-inflated balloon will pop more easily, as it is stretched too tightly. This is a good moment to reinforce that stretch has limits*
- Tie the balloon closed

Step 2: Find the thicker parts of the balloon

- Hold the balloon in your hands
- Feel the balloon near the tied end, and the opposite end. These areas are “thicker” and can stretch more easily than the sides of the balloon

Step 3: Make the Skewer Slippery

- Either dip the tip of the skewer in a dollop of dish soap, or apply a small bead of dish soap directly onto the thick portion of the balloon from the previous step
- Teacher prompt: “The soap makes the skewer slippery (or reduces friction), which helps it slide through the balloon, instead of grab”

Controlled Descent

Activity Directions Continued

Step 4: Test the balloon carefully

- Place the skewer on the thicker end of the balloon (opposite the knot)
- Slowly press and gently twist the skewer
- Take your time. Go slow. Slow pressure helps the balloon to stretch instead of tear



Step 5: Slide the skewer through

- Keep twisting slowly until the skewer goes into the balloon
- Continue gentle twisting and sliding the skewer through the balloon
- Watch how the balloon stretches around the skewer instead of popping



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Discussion Prompts or Reflection

- Before starting: What do you think would happen to a balloon if you poked it with something sharp?
- How might soap help the skewer go through the balloon?
- What have you learned about stretchy materials?
- Why do you think it's important to push the skewer into the thicker parts of the balloon, instead of the thinner parts?

Variations and Enrichment

- If time permits, challenge the students to see who can pierce their balloon with *the most* skewers before it pops
- Consider allowing students to attempt to pierce the balloon without soap on their first try. Giving no guidance, invite them to inflate their balloon, and then challenge them to pierce it with a skewer without popping it. This helps to highlight how a little bit of knowledge about our materials can help us to do what seems impossible.

Foundation Exploration

- **Builders** use materials like rubber, foam, and seals that must stretch without breaking. If materials stretch too much or not enough, buildings and structures may not work the right way
- **Toy and Sports Equipment Makers** use stretchy materials so they can bounce, bend, and move safely
- **Repair Workers and Installers** use rubber seals, hoses, and straps that need to stretch to fit and tighten back into place