

Skewer a Balloon



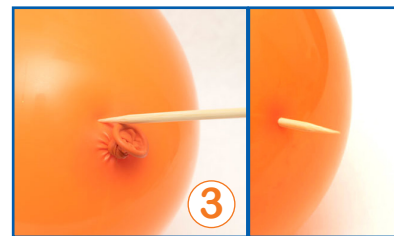
Items Needed:

- Round Balloons
- 12-inch Bamboo Skewers
- Liquid Soap



Directions:

- 1 Inflate the balloon, leaving the end somewhat thick and put a knot in the mouthpiece.
Do not inflate the balloon completely!
- 2 Rub Liquid Soap over the skewer from point to end.
- 3 Push and twist the skewer through the area near the knot and through the thick part of the balloon at the end. The tip of the skewer should pass completely through the balloon.
- 4 Pull the skewer completely out of the balloon, and quickly push it through the side of the balloon. Because the side is thin, the balloon will burst.



Activity Explained:

The rubber in the balloon consists of many long molecules that are linked together. It's similar to the way all of the noodles in a plate of spaghetti stick together. These long molecules are called polymers; when molecules of a polymer are chemically attached to each other, it is called cross-linking. These links hold the polymer molecules together and allow them to stretch...up to a point. When the force or tension pulling on the cross-links is too great, they will break, and the polymer will pull apart. **Look at the rubber near the ends of the balloon where you first inserted the skewer. Does it look lighter or darker than the rubber in the rest of the balloon?** The rubber at the ends of the balloon is stretched out less than in the middle of the balloon. Therefore, there is less force pulling on it. This allows the tip of the skewer to break some polymer cross-links, push aside the molecules of rubber, and slide into the balloon. However, enough cross-links remain so that the balloon holds together. In the side of the balloon, there are fewer polymer molecules. When you push the tip of the skewer through the rubber in the side of the balloon and the skewer breaks a few of the cross-links, the tension on the remaining cross-links is too great, and the balloon pops.

How does this apply?

In order to design and construct buildings, engineers must know the stresses that different materials can stand, so that they will build a strong and safe structure. They need to know where to drill holes and how much weight and force each piece will withstand.



Bible Lesson

When constructing any kind of building, the stones or bricks placed on the very first level need to be strong because they hold the weight of the entire structure. It's these stones that form what's called the foundation. And in that foundation, the most important and the very strongest stones are the ones that are used for the corners because they hold the most weight of all. In the Bible, Jesus describes Himself as our cornerstone. That's because Jesus is our strength. When we place Him in the most important position in our lives, we can't go wrong. He turns all of our weaknesses into strengths. He'll never crack under the pressure of the weight of your problems, cares, or worries. You can trust Him with every single aspect of your life.

Isaiah 28:16 says, "Therefore thus says the Lord GOD: "Behold, I lay in Zion a stone for a foundation, A tried stone, a precious cornerstone, a sure foundation; Whoever believes will not act hastily."