

NEEDLE THROUGH BALLOON

A magic trick is an excellent way to introduce a lesson or to use as a discrepant event for an anticipatory set. It can be used to illustrate a concept, act as a starting point for an investigation, or to stimulate creative thinking. Allowing students to brainstorm in an attempt to figure out an explanation for how the trick works helps in developing important critical thinking skills. I sometimes have students turn in a diagram illustrating the science concepts involved for extra-credit. Often there is more than one "correct" explanation.

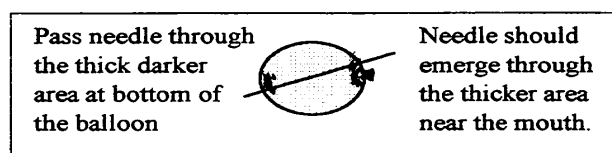
We also challenge students to invent a magic trick or to perform "science magic" for the class and explain the science principles involved. Example: Use balloons to talk about cells and cell membranes. The cell membrane is a semi-permeable membrane. It allows some things to pass through and prevents others from doing so. Pass a needle through the balloon to illustrate this concept.

Purchase high quality clear round balloons about 9" to 11" in diameter. Inflate the balloon and tie it off. Push an oiled (I use Vaseline) needle through the darker (thicker) area in the bottom of the balloon and out through the darker area around the mouth. The balloon doesn't burst (usually). Pull the needle out of the balloon. Now poke the side of the balloon with the needle. BANG! It will burst.

Smooth bamboo skewers will work well as needles. Dip the end in Vaseline before class. Knitting (darning) needles that have a sharpened end also works well. I have even used straightened coat hangers that have been sharpened to a point with a file as needles. You can also buy the trick "Needle Through Balloon" at a magic shop or some novelty shops.

You can use this for a problem solving activity by presenting it as a question. Challenge students to figure out how the Trick works. Ask leading questions but DO NOT TELL THEM THE SECRET!

Hint: Don't blow balloon up to its maximum size. The softer the better.



The reason we are able to push the needle through the balloon is because balloons are made of rubber or latex. These thin sheets are made of many long intertwined strands of polymer molecules. The polymer molecule is kind of like a coiled spring that can stretch. When the balloon is inflated, the polymer strands are stretched. The middle area of the balloon stretches more than the thicker areas near the mouth and the area opposite the mouth. The lubricated needle can be pushed through the strands in those places because the strands are not fully stretched. This gives them enough elasticity to stretch around the needle. When the needle is pushed through the stretched strands on the side of the balloon, the strands break, causing the balloon to pop.

Try having your students find other methods to push the needle through the balloon without it popping (such as putting a piece of tape on the side of the balloon before inserting the needle). What happens if you try the same thing using a water balloon or a water filled zip-lock bag? Try using a sharp pencil with a zip-lock bag instead of a needle? (It works) Have Fun!