LEAK PROOF BAG

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THE LEAK-PROOF BAG

Polymer chains work together to prevent water from leaking out of a bag. With the Leak-Proof Bag experiment, we'll show you how you can stick a bunch of pencils right through a bag of water without spraying water all over the kitchen table. The secret isn't sorcery, it's just the chemistry of polymers.

Materials
• Sharpened pencils
• Zipper-lock plastic bags
• Water
• Paper towels

EXPERIMENT
Before we let you loose on demonstrating this experiment for an audience, it would probably be best to practice this over a sink, outside, or at a friend's house. Just don't make Mom mad by allowing her to come home to water puddles in the living room.
1. If you have your pencils, make sure they are sharpened to a point. The sharper, the better. If they're already sharpened… shucks… move to step 2!
2. Fill a zipper-lock bag between 1/2 and 3/4-full with water. Cold, warm… it doesn't particularly matter.
3. Now for the fun part, ask your audience what would happen if you tried to push one of these pencils through the water-filled bag? Odds are that you'll have more than one look of fear or skepticism. You might even have some people running for their ponchos and galoshes.
4. Here comes the real scary part! Hold the pencil in one hand and the top of the bag in your other hand. Slowly, but firmly, push one of the sharpened pencils through one side of the bag. Weird… no water came gushing out!

5. Push the pencil through the other side of the bag, too. Nothing happens. Sweet!

NOTE: Do not, I repeat, do not push the pencil all the way through either side of the bag. As soon as the eraser gets past the bag, you'll have a big, wet mess on your hands… er… floors.

6. From here, you can keep demonstrating your science "spear-it" by repeating this feat with the other sharpened pencils!

7. Once you're finished, hold the bag over a sink and remove the pencils. The water will come pouring out of the holes.

What other items do you think would work for this demonstration? Try using sharpened barbecue skewers with a zipper-lock bag. Another option is to try using a water-filled grocery bag. What materials work? Which materials leak?

HOW DOES IT WORK?
Despite what it looks like, the zipper-lock bag isn't covered in a magical sealant that blocks leaks. Well… not exactly. Plastic bags like these are made out of our favorite kind of materials, polymers! Polymers are long chains of individual molecules, called monomers. (See that? Mono = one. Poly = many. Mers = molecules.) When you puncture these bags with a sharpened pencil, you're essentially separating polymer chains without breaking them. The long chains of molecules then squeeze in tight around the surface of the pencil preventing any sort of leak. Polymers continue to prove an indispensable part of life.
HERE IS WHAT YOU NEED

ROUND PENCILS
PLASTIC BAG
WATER
1 Fill the bag half full with water
2 Seal the bag
MAKE SURE YOUR PENCILS ARE SHARP

3
PUSH THE PENCIL THROUGH THE BAG
KEEP GOING!