Waterproof Hanky
Lesson Plan

Amount of time Demo takes: 1-2 mins.
Try this at home!

Materials
- 12-ounce drinking glass
- A handkerchief or a thin piece of fabric (2/hr)
- Water to fill glass
- Water bucket
- Bowl

SAFETY!
- Be sure to clean up any water spills, esp. when working in areas with slippery floors.

Lesson’s Big Idea
- **Surface Tension:** When the handkerchief is loose, the water can pour through the gaps in the fabric’s weave. But when it is pulled tight, the water molecules are able to form a single membrane across the material.
- **Pressure:** The air surrounding the glass is pressing on this membrane. The air pressure surrounding the glass is greater than the pressure inside. This helps hold the water inside the glass.

Instructional Procedure
1. Place the fabric loosely over the glass.
2. Pour water through the loose fabric until the glass is mostly full. It is important to illustrate that the fabric itself is not waterproof.
3. Stretch the fabric **very tightly** across the glass.
4. Turn the glass upside down (over someone else’s head if you feel confident...)

Background Information
- The key to this trick is to pull the hanky really tight – think of those old-fashioned canvas tents that Scout and Guide groups used to use. The canvas was pulled really tight to keep out the rain, but you couldn’t touch the sides of the tent otherwise water would come through the canvas.
• It’s the same with this trick – due to surface tension, the water forms a membrane across the cloth. If you poke the handkerchief, however, the surface tension will be broken and water will spill out from behind the cloth.
• The fabric is not watertight, but airtight, which is enough to hold the water in.
• The diagram to the right illustrates what is occurring between the water, the air, and the fabric.

Clean Up
• Clean up between demos if needed. When completely finished gather all materials listed for this demonstration and make sure everything is accounted for. If something was used up, broken or damaged, let someone know so it can get replaced or fixed.

References
• <http://www.thenakedscientists.com/HTML/content/kitchenscience/exp/waterproofhankey-1/>.
• http://www.thenakedscientists.com/HTML/content/kitchenscience/exp/waterproof-hankey-1/
• http://www.physics.org/tricks/waterproof-hanky/

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