

Why Wash? Family Challenge

Wash your hands, and play with your soap!



Materials

Vaseline-glitter mixture • pitcher of water • bucket • foaming pump soap • paper towels • food color • sheet of paper • shaving cream • paper plate • piece of paper • craft stick • toothpicks • straw or pipet • paper towels for cleanup

Part 1: Wash This Way

1 Have your adult partner squeeze a pea-sized amount of glitter mixture onto your hands. Rub your hands together to thoroughly coat the palms, backs of hands, and between the fingers. The glitter mixture represents "germs."

2 Hold your hands over the bucket and have your adult partner pour a little water over your hands to wet them. Rub your hands together. Have your adult partner pour more water over your hands to rinse them. Dry your hands with a paper towel.

① *How well did rinsing and drying your hands remove "germs"?*

3 Hold your hands over the bucket and have your adult partner squirt some foam soap into your hands. Rub your hands together. Have your adult partner pour more water over your hands to rinse them. Dry your hands with a paper towel.

② *How clean do your hands look this time?*

Part 2: Soapy Prints



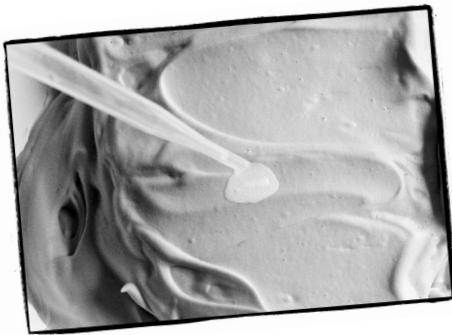
1 Spray a pile of shaving cream or foaming soap (about the size of a slice of bread) onto a paper plate.

2 Use a craft stick to flatten and spread out the shaving cream. Apply drops of food color to the surface of the shaving cream, one drop at a time.

3 Drag a toothpick through the colored drops on the shaving cream to create patterns—try lines, curves, and spirals.

4 Press a piece of paper onto the surface of the shaving cream. The paper will become wetted, and the color pattern may show through. Pull the paper off the shaving cream, and scrape off the excess shaving cream using the craft stick.

③ *What does the paper look like?*



- 5 Stir the shaving cream until all the color is mixed in evenly.
 - 6 Using a straw or pipet, apply a single drop of water to the surface of the colored shaving cream and observe.
 - 7 *What happens when you drop water on the evenly colored shaving cream?*
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- 7 Make a design by applying additional drops of water at different places on the surface, and repeat steps 3 and 4.

Explanation

The glitter particles used to represent germs in this activity are much bigger than actual germs. In everyday language, "germs" refers to microscopic disease-causing organisms. Not all microscopic organisms (microbes) are harmful. Many are necessary to keep us healthy.

Unfortunately, some people rarely wash their hands when they should, and those who do wash may overestimate how thoroughly they do it. For example, you've probably seen people in public restrooms quickly rinse their hands with water and use no soap. This is not an effective way to wash your hands.

This activity uses glitter to show that a quick rinse of the hands with water leaves lots of germs behind. Just about every time this activity is done, water, soap, and vigorous scrubbing will result in the cleanest hands.

Dirt and grime on your hands are usually contained in a layer of oil. It's this oil that makes it a challenge to wash things with water alone, because oil and water don't mix. The trick to cleaning is to use something that works with the water to pick up the oil. That's where soap comes in. Soap molecules have one end that is attracted to the oil and another end that is attracted to water. While you wash, the soap molecules' water-hating tails cluster around oil droplets to form suspended droplets (micelles). Dirt and oil are embedded (trapped) in these micelles and get flushed down the drain during the rinse because the water-loving heads are attracted to the water.

Part 2 of this activity uses shaving cream or foaming soap to create designs. Experts consider shaving cream a lather. It is a mixture of a liquid (soap dissolved in water), tiny bubbles of the propellant gas (butane), and solid soap. This lather supports the food color marble design until the design is transferred on the water-absorbent paper.

When water is dropped on the surface of the uniformly colored shaving cream, a white spot immediately forms. This spot results from the lowering of the surface tension at the point of contact. The food color originally present in the area is pushed out of the way as the surface tension is lowered.

Try at Home

Label two clear zipper-bags "unwashed hands" and "soap." Then, work with an adult partner to do the following:

After not washing your hands for several hours, peel an apple and cut it in half on a cutting board. Place half of the apple in the bag labeled "unwashed hands" and tightly close the bag. Dispose of the other half of the apple. Now, wash your hands thoroughly with regular soap and warm water, lathering for at least 20 seconds. Also wash the peeler, knife, and cutting board thoroughly with warm water and soap. Peel another apple and cut it in half. Place half of the apple in the bag labeled "soap" and tightly close the bag. Dispose of the other half of the apple.

Place the bags in a warm place. Observe the apples once a day for at least one week. Do not open the bags during this time. Record your observations. At the end of the week, throw away the bags with the apples still inside. Do not open the bags.

Both apple pieces will turn brown within 30 minutes to an hour. This is due to the reaction of the apple with oxygen and is not a result of microbial activity. The appearance of bacterial or mold growth and the resulting rot will not be visible to the naked eye for several days. Typically, an apple cut with unwashed hands grows mold in about five days and is covered in mold and decomposing after seven days. An apple cut with well-washed hands only has minor traces of mold after a week.