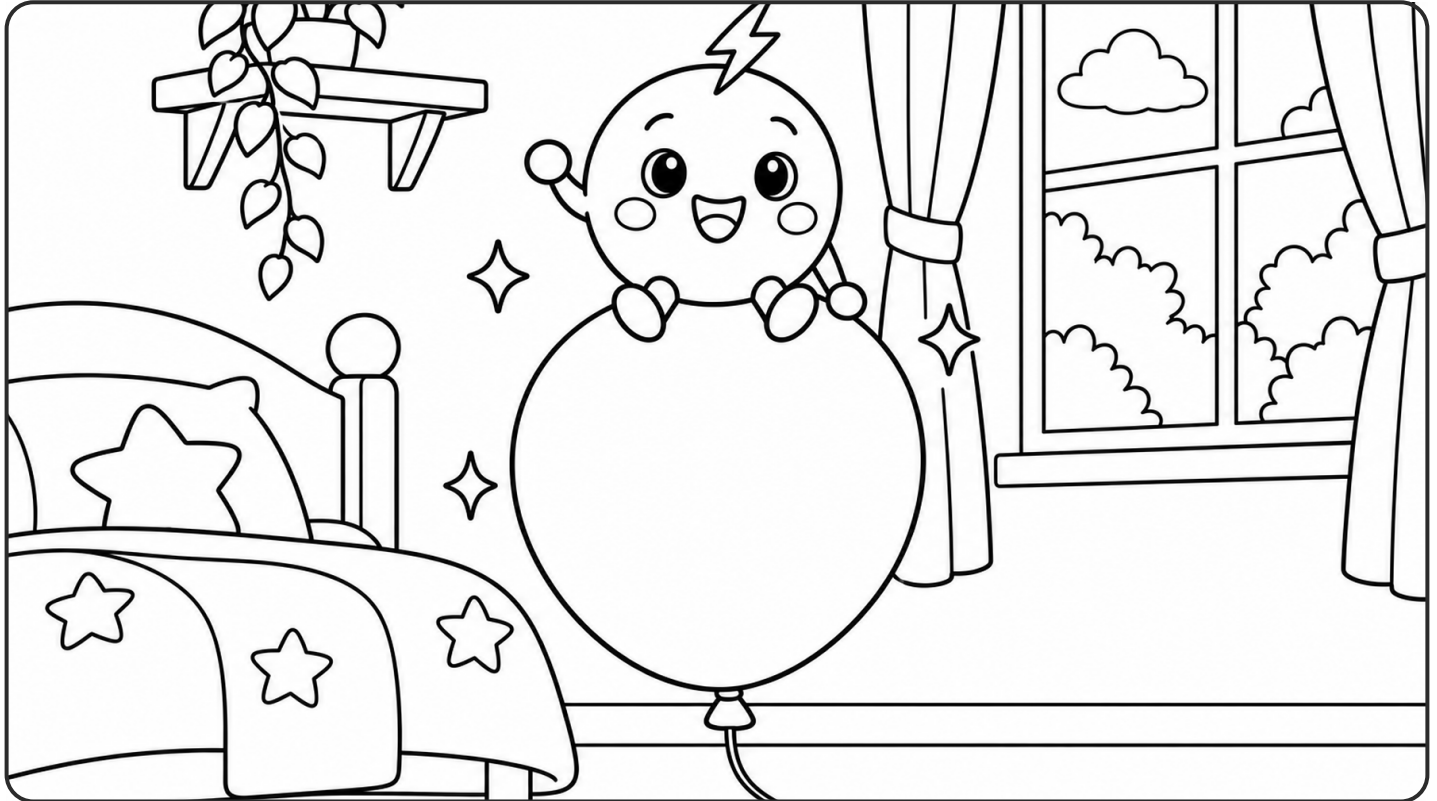


Why does a balloon stick to my hair when I rub it?



You rub a balloon on your head, and then you lift it up. Your hair stands up and sticks to the balloon! Why does that happen?



Why?

1. Everything is made of tiny, tiny bits.

Your hair, the balloon, even the air. Around those tiny bits zoom even tinier things, called electrons. Most of the time, things have just the right number of electrons. Everything is even, and nothing happens.

2. Rubbing makes electrons jump from your hair to the balloon.

Rub, rub, rub! More and more electrons hop over. Now the balloon has extra electrons, and your hair has lost some. Things are not even anymore.

3. Extra and missing pull together. The same push apart.

So your hair reaches up for the balloon. It wants its electrons back! And every hair on your head has lost electrons, so the hairs push each other away. That is why they stand up and spread out.

Try it! Jumping tissue bits

You need: a balloon, a tissue, a table, and a grown-up

1. Tear a tissue into tiny bits and put them on a table.
2. Rub a balloon on your hair, then hold it just above the bits. They jump up to the balloon!
3. Then press the balloon against a wall, and let go. Does it stay?

What happened? Rubbing moved electrons from your hair onto the balloon. That is static electricity at work!

Video + more questions:
whywhywhykids.com/static

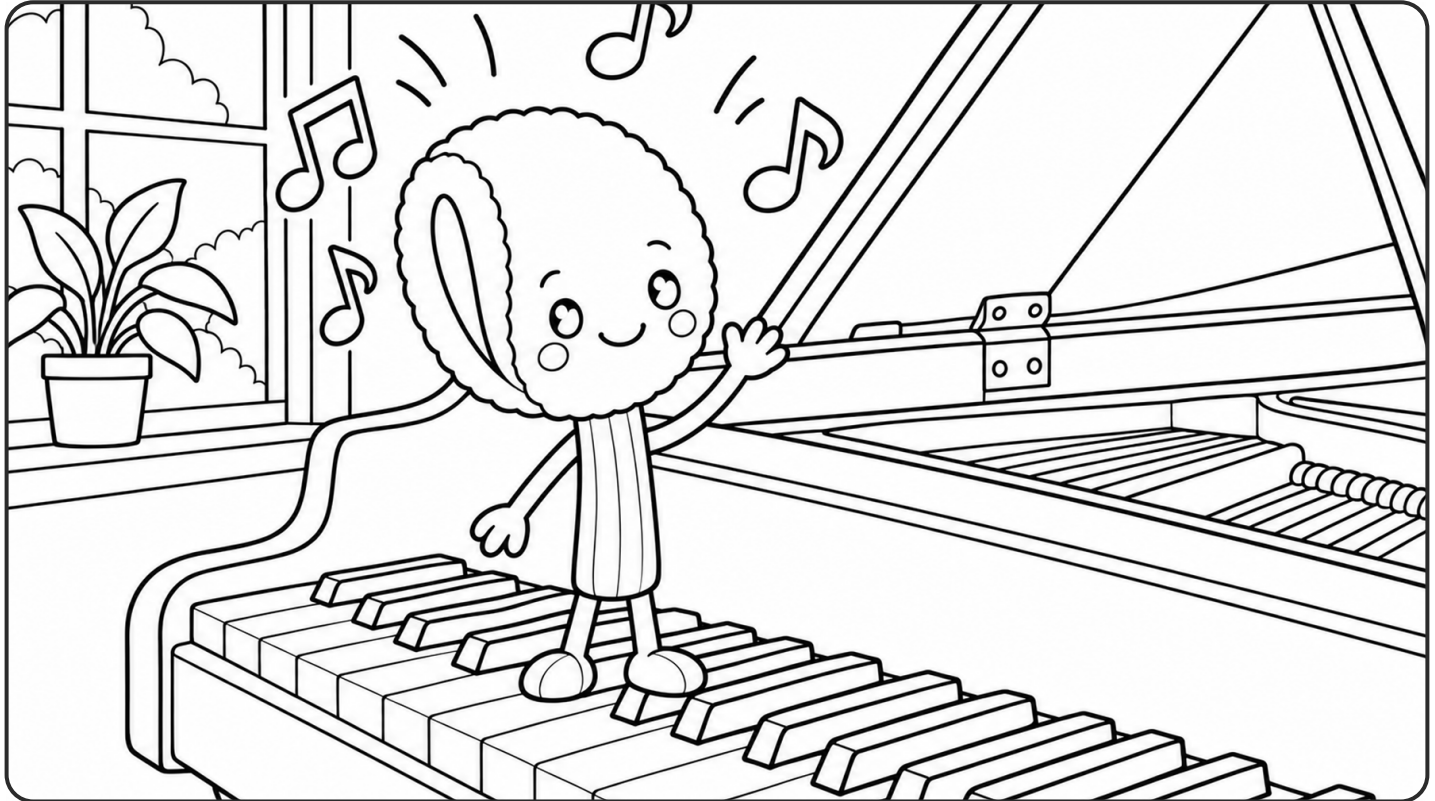


scan with a grown-up

How does a piano work?



When you press a piano key, a beautiful sound comes out. But how does a piano work?



Why?

1. Every key is really a long see-saw.

When your finger pushes one end down, the other end pops up, and it tosses a hammer toward the strings.

2. Bonk! The hammer hits a string, and the string wiggles.

The hammer bounces right back, as quick as a blink. The string wiggles back and forth, hundreds of times every second. This is called vibration. The wiggle pushes the air, and the air carries it to your ears. That is sound!

3. The soundboard makes it loud.

One thin string is very quiet. So the strings rest on a big, thin sheet of wood called the soundboard. The whole board wiggles too, and pushes lots and lots of air. Now the sound can fill the room.

Try it! Make a box hum

You need: an empty box and a rubber band

1. Stretch a rubber band around an empty box.
2. Pluck it. See it wiggle? Hear it hum?
3. Now pull it tighter. Does the note go higher?

What happened? The wiggling band pushes the air, just like a piano string. Pull it tighter, and the note goes higher!

Video + more questions:
whywhywhykids.com/piano

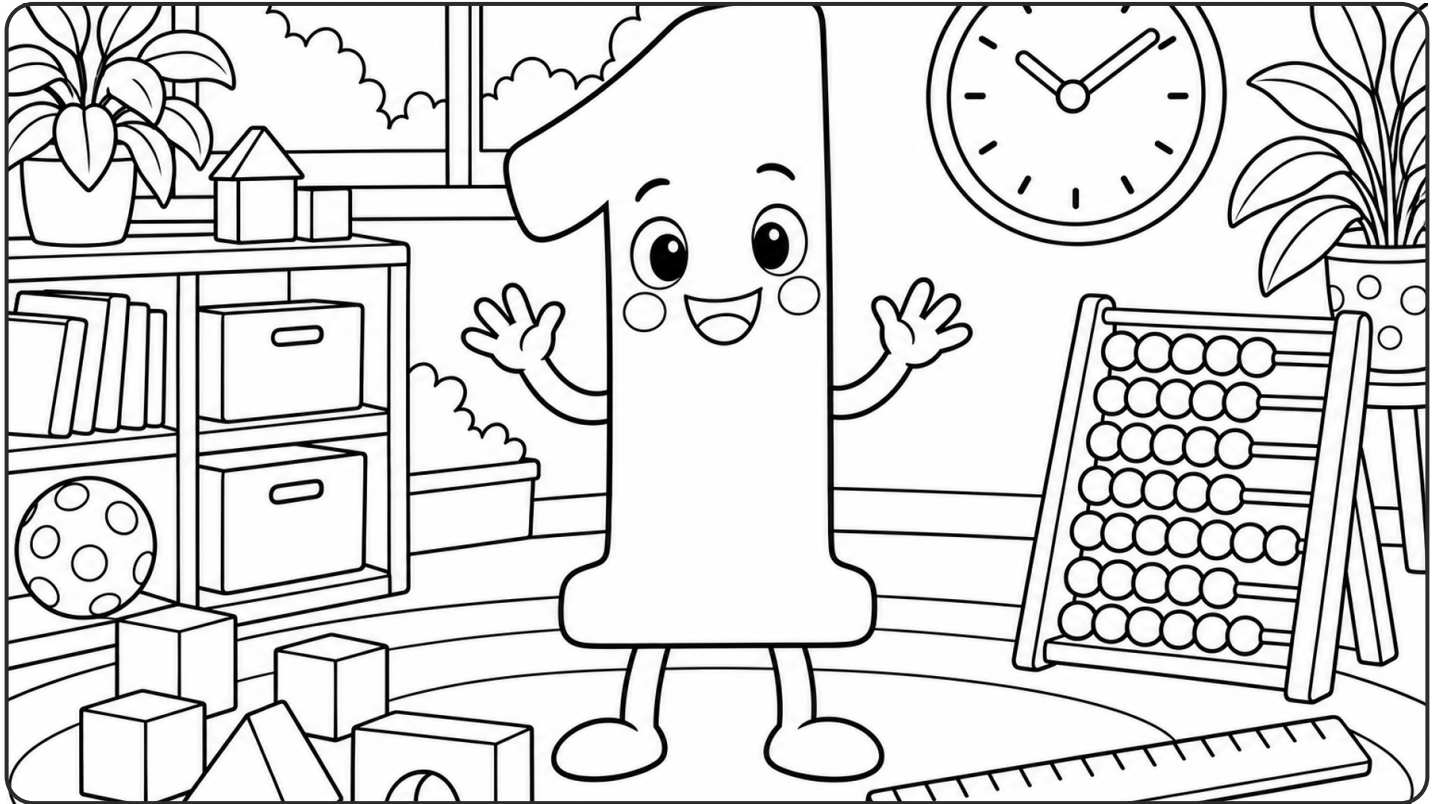


scan with a grown-up

What would the world be like without math?



What would the world be like if there was no math?



Why?

1. Math is not just homework!

Math is counting, measuring, shapes, and patterns. It is a way of thinking that helps us understand the world.

2. Without math, nobody could count, or tell the time.

How many cookies are there? Did everyone get the same? How old are you? There would be no clocks and no calendars, so you would not know when school starts, or when the bus comes.

3. Without math, things would wobble and fall down.

Builders use math to measure. Without it, walls would be crooked, doors would not fit, and bridges would wobble. And phones, computers and video games are all made of numbers inside.

Try it! Math hunt

You need: just your eyes

1. Today, count every time you use a number.
2. Look at the clock, your shoe size, the pages of a book, the points in a game.
3. How many did you find? I bet you will find more than twenty!

What happened? Numbers are everywhere. Math is a superpower, and it belongs to all of us.

Color Digit too!



Video + more questions:
whywhywhykids.com/math



scan with a grown-up

How do glow sticks glow?



A glow stick has no battery, no wire, and no switch. You just bend it, shake it, and it glows. How does that work?



Why?

1. Snap! Two liquids mix.

A glow stick is a plastic tube filled with a liquid. Floating inside is a thin little glass tube, with a different liquid in it. When you bend the stick, the glass tube cracks. Shaking helps the two liquids mix all the way.

2. Mixing starts a chemical reaction.

Tiny bits of the two liquids bump into each other and change into new stuff. As they change, they give off a little bit of energy. That energy gets handed to the color in the stick, called a dye.

3. Electrons jump up and fall down, and make light.

When an electron in the dye gets the energy, it jumps up high, like a kid on a trampoline. Boing! Then it falls back down, and lets the energy go as a tiny flash of light. Millions of electrons do this again and again, and the whole stick glows!

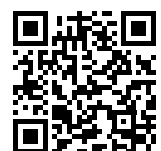
Try it! Warm or cold?

You need: two glow sticks of the same color, a cup of warm tap water, a cup of ice water, and a grown-up

1. With a grown-up, snap two glow sticks of the same color.
2. Put one in a cup of warm tap water, and one in a cup of ice water.
3. Turn off the lights. Which one glows brighter? And which one lasts longer?

What happened? Warm makes the reaction go faster, so the stick glows brighter but runs out sooner. Cold slows it down, so it glows dimmer but lasts longer.

Video + more questions:
whywhywhykids.com/glow

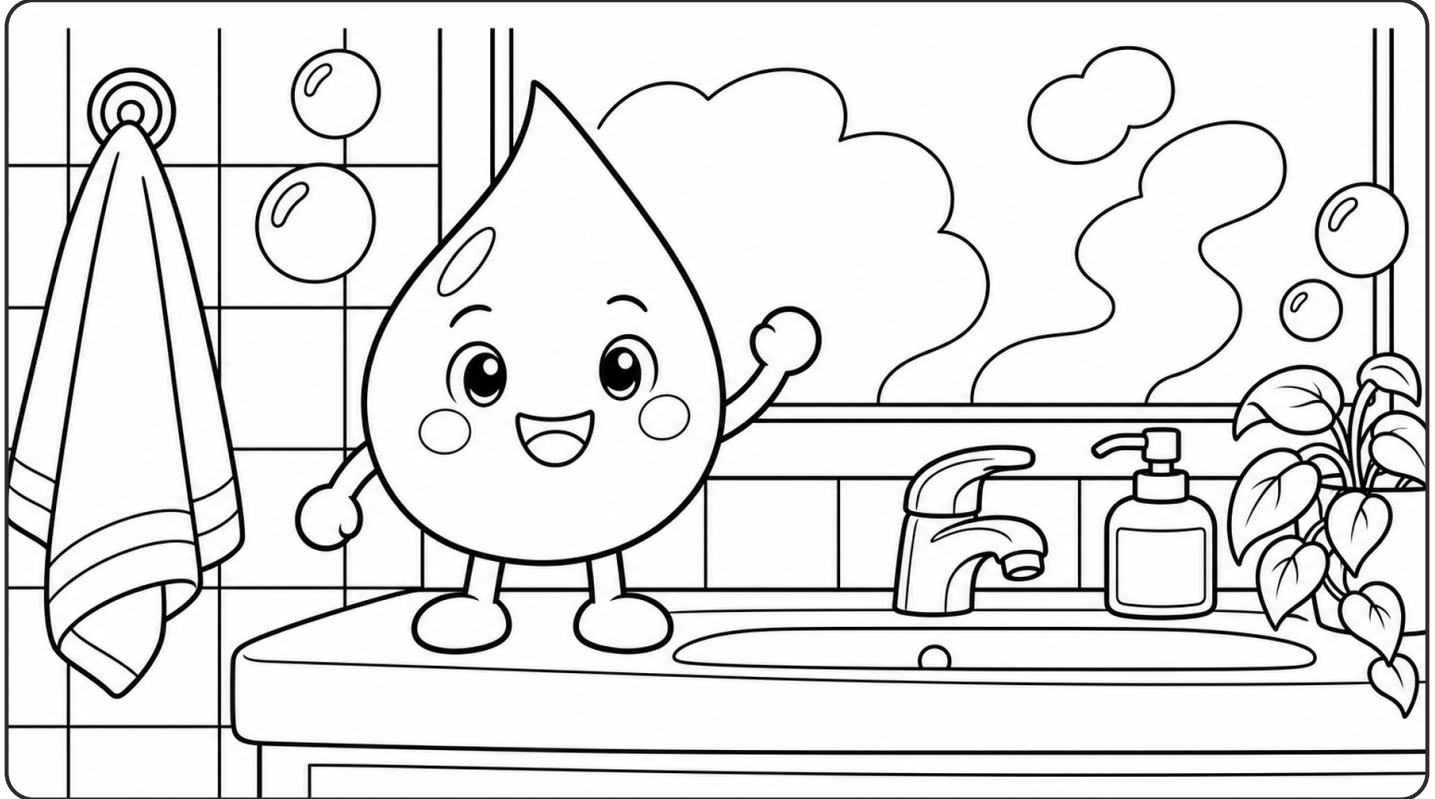


scan with a grown-up

Why does the bathroom mirror get foggy after a shower?



I take a nice hot shower. When I step out, the mirror is all foggy, and I cannot see my face! Why does the bathroom mirror get foggy?



Why?

1. Hot water sends tiny water bits into the air.

Water is made of teeny tiny water bits, and they are always wiggling. When water is hot, some bits wiggle so fast that they fly off into the air, as a gas you cannot see. It is called water vapor. A hot shower fills the whole bathroom with them.

2. On the cool glass, the water bits slow down and stick.

The mirror is much cooler than the warm, wet air. When the flying water bits bump into it, they lose their heat and slow down, so they cannot fly anymore. They huddle together and turn into thousands of tiny drops.

3. Tiny drops make a white blur.

Each little drop bends the light in a different direction. So the mirror cannot show a clear picture anymore. That is the fog!

Try it! Breathe on a mirror

You need: a small mirror or a spoon

1. Hold a small mirror or a spoon close to your mouth, and breathe out slowly. Haaa! It gets foggy.
2. Now watch closely. How fast does the fog go away?
3. Then draw a smiley face in the fog on the bathroom mirror!

What happened? Your warm breath has water bits in it.

On the cool glass they turn back into tiny drops, just like after a shower.

Video + more questions:
whywhywhykids.com/mirror

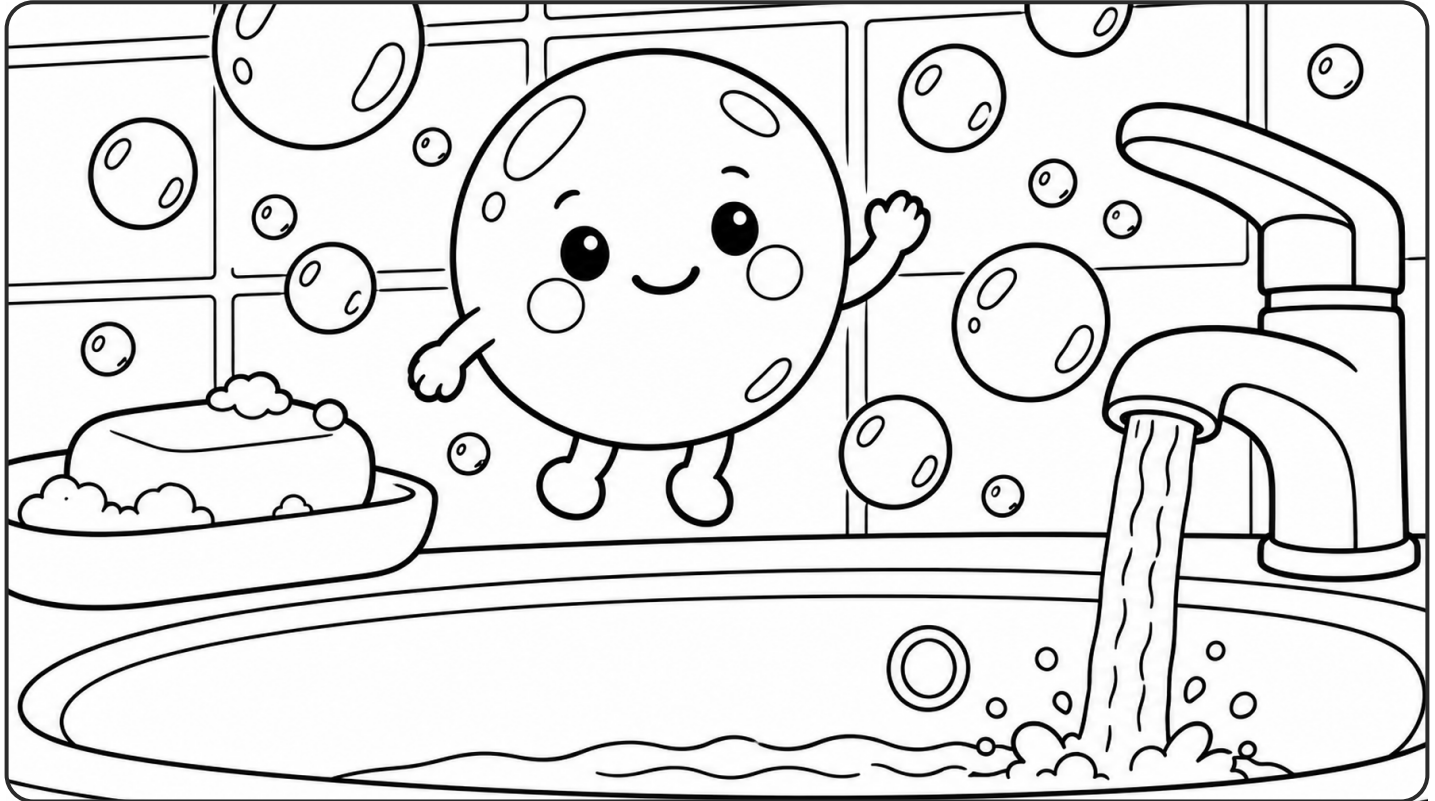


scan with a grown-up

How does soap get the dirt off my hands?



My hands are dirty. I rinse them with water, but they still feel greasy. Then I add soap, and they come out clean! How does soap get the dirt off?



Why?

1. Dirt and germs get stuck in the oil on your skin.

Your skin always has a thin layer of oil on it, and dirt sticks in it like crumbs stuck in butter. Water alone can't help. Water and oil do not mix, so the water just rolls over the oil and runs away.

2. Every tiny bit of soap has two ends.

One end loves water. The other end loves oil. When you rub soap on your hands, the oil-loving ends dive right into the oil and hold on tight.

3. Soap wraps the oil into tiny balls.

More and more soap bits crowd around a drop of oil, with the dirt and germs trapped inside. The outside of the ball is covered with water-loving ends, so when you rinse, the water carries the balls down the drain. Bye bye, germs!

Try it! Oil, water and soap

You need: a clear jar with a lid, water, a spoon of cooking oil, a squirt of dish soap, and a grown-up

1. Ask a grown-up for a clear jar with a lid. Put in some water and a spoon of cooking oil, close it, and shake.
2. Wait a minute. The oil floats back to the top.
3. Now add a squirt of dish soap and shake again. This time, do they stay mixed?

What happened? The oil-loving ends of the soap grab the oil, and the water-loving ends grab the water. So the oil and water stay mixed.

Video + more questions:
whywhywhykids.com/soap



scan with a grown-up