Name: _____ Date: _____

How Soap Pulls Germs Apart

Circle group

Water can rinse off some dirt. But it does a poor job on greasy hands. Oil and water do not mix. So the grease, and the germs stuck in it, stay on your skin while the water runs by. Soap fixes this. A soap molecule has two different ends.

One end likes water. The other end likes oil and fat. It does not like water. When you rub soap on wet hands, the oil-loving ends dig into the grease. They also dig into the fatty layer around some germs, even some viruses. The water-loving ends point out toward the water. When you rub, soap molecules surround tiny bits of grease and pull them loose. They make little clusters called micelles. Soap can also break apart the fatty coat of some germs. Running water then rinses the clusters down the drain.

How you wash matters. Rubbing makes friction. Friction lifts dirt and loosens germs from your skin. Experts say to scrub for about twenty seconds. That is about as long as singing a short song two times. Wash the backs of your hands, between your fingers, and under your nails. People often miss those spots. Dry your hands after, because wet skin spreads germs more easily.

Hand sanitizer with enough alcohol also works when you have no soap. But it does not clean off dirt or grease as well. Soap and water are still the best.

Questions

1. Why does water alone fail on greasy hands?

_____

_____

2. What are the two ends of a soap molecule like?

_____

_____

3. What are micelles?

_____

_____

4. How long should a person scrub?

_____

_____

5. Why does rubbing your hands help?

_____

_____

6. Why is sanitizer not as good as soap and water?

_____

_____

Words to know

molecule: a very tiny particle made of joined atoms
friction: the rubbing force between two things that touch
micelles: tiny balls of soap that trap bits of grease inside
viruses: extremely small germs that can make people sick
sanitizer: a liquid or gel used to kill germs on skin

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

How Soap Pulls Germs Apart

Triangle group

Water alone rinses away some dirt, but it does a poor job on greasy hands. Oil and water do not mix, so grease and the germs stuck in it cling to the skin while the water flows past. Soap solves the problem with a clever molecule that has two different ends.

One end of a soap molecule is attracted to water. The other end is drawn to oil and fat and avoids water. When you rub soap on wet hands, the oil-loving ends dig into grease and into the fatty outer layer that surrounds some germs, including certain viruses. The water-loving ends point outward toward the water. Under friction, soap molecules surround tiny bits of grease and pull them loose, forming little clusters called micelles. In some germs, soap can also pry apart the fatty coating, which breaks the germ open. Running water then carries the clusters down the drain.

This is why the way you wash matters. Rubbing creates friction that lifts dirt and loosens germs from the ridges of your skin. Health agencies suggest scrubbing for about twenty seconds, roughly the time it takes to sing a short song twice. Cover the backs of your hands, the spaces between your fingers, and the areas under your nails, since those spots are often missed. Dry your hands afterward, because damp skin spreads germs more easily.

Hand sanitizer with enough alcohol also works when soap is unavailable, but it does not remove visible dirt or grease as well. Plain soap and water, used patiently, remain the standard for clean hands.

Questions

1. Why does water alone fail on greasy hands?

_____

_____

2. What are the two ends of a soap molecule like?

_____

_____

3. What are micelles?

_____

_____

4. About how long should a person scrub?

_____

_____

5. Why does rubbing your hands together help?

_____

_____

6. Why does sanitizer not fully replace soap and water?

_____

_____

Words to know

molecule: a very tiny particle made of joined atoms
friction: the rubbing force between two things that touch
micelles: tiny balls of soap that trap bits of grease inside
viruses: extremely small germs that can make people sick
sanitizer: a liquid or gel used to kill germs on skin

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

How Soap Pulls Germs Apart

Square group

Plain water can rinse away some dirt, but it performs poorly on greasy hands. Because oil and water refuse to mix, grease and the germs trapped within it cling to the skin while the water streams past. Soap overcomes this obstacle with an ingenious molecule that possesses two entirely different ends.

One end of a soap molecule is attracted to water, whereas the other end is drawn toward oil and fat and shuns water. When you rub soap onto wet hands, the oil-loving ends burrow into the grease and into the fatty outer layer that encloses some germs, including certain viruses, while the water-loving ends point outward toward the water. Under friction, soap molecules encircle tiny droplets of grease and pull them free, forming small clusters called micelles. In some germs, soap can also pry apart the fatty coating, which causes the germ to break open. Running water then sweeps the clusters down the drain.

For this reason, the way you wash matters considerably. Rubbing generates friction that lifts dirt and loosens germs from the ridges of your skin. Health agencies advise scrubbing for roughly twenty seconds, about the time it takes to sing a short song twice. Be sure to cover the backs of your hands, the spaces between your fingers, and the areas beneath your nails, since these spots are frequently overlooked. Dry your hands afterward, because damp skin transfers germs more readily.

Hand sanitizer containing enough alcohol also works when soap is unavailable, although it does not remove visible dirt or grease as effectively. Plain soap and water, used patiently, remain the standard for clean hands.

Questions

1. Why does plain water perform poorly on greasy hands?

_____

_____

2. What are the two ends of a soap molecule like?

_____

_____

3. What are micelles?

_____

_____

4. Roughly how long do health agencies advise scrubbing?

_____

_____

5. Why does rubbing your hands together help?

_____

_____

6. Why does sanitizer not fully replace soap and water?

_____

_____

Words to know

molecule: a very tiny particle made of joined atoms
friction: the rubbing force between two things that touch
micelles: tiny balls of soap that trap bits of grease inside
viruses: extremely small germs that can make people sick
sanitizer: a liquid or gel used to kill germs on skin

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: How Soap Pulls Germs Apart

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: How Soap Pulls Germs Apart

Easier · 237 words · Flesch-Kincaid grade 3.2

1. Oil and water do not mix, so the grease stays on the skin.
2. One end likes water and the other end likes oil and fat.
3. Little clusters of soap around tiny bits of grease.
4. About twenty seconds.
5. Friction lifts dirt and loosens germs from the skin.
6. It does not clean off dirt or grease as well.

Triangle: How Soap Pulls Germs Apart

This passage · 262 words · Flesch-Kincaid grade 7

1. Oil and water do not mix, so the grease stays on the skin.
2. One end is attracted to water and the other end is drawn to oil and fat.
3. Little clusters of soap molecules around tiny bits of grease.
4. About twenty seconds.
5. The friction lifts dirt and loosens germs from the skin.
6. It does not remove visible dirt or grease as well.

Square: How Soap Pulls Germs Apart

Harder · 271 words · Flesch-Kincaid grade 9.4

1. Oil and water refuse to mix, so the grease stays on the skin.
2. One end is attracted to water and the other is drawn toward oil and fat.
3. Small clusters of soap molecules that surround tiny droplets of grease.
4. About twenty seconds.
5. The friction lifts dirt and loosens germs from the ridges of the skin.
6. It does not remove visible dirt or grease as effectively.