



Science Lesson: Drops of Water on a Penny

Leadership Lesson: Teamwork - Sticking Together

How many drops of water can you put on a penny without them overflowing? Can you fit more on the “heads” side or on the “tails” side? How come the water seems to form a bubble over the penny as you add more and more drops? What happens if you use soapy water or rubbing alcohol? It all has to do with surface tension and how some molecules (like water) seem to stick together.

How about your group/class/team/family – do you stick together? How do you feel when you have a safety net so even if you mess up there are always people there to pull you back? Who is your safety net?

Drops of Water on a Penny



1. Hold dropper at a 45° angle when dropping water on the penny.
2. Do not touch the tip of the dropper to the water on the penny.
3. Put penny on a paper towel.
4. Count only the full drops of water that fall onto the penny. (Sometimes air bubbles come out of the dropper and they look like a full drop of water has just come out. Don't count those air bubbles.)

How many drops of water can you drop on a penny before the water spills over?

Heads _____ (your guess) Actual (Trial 1) _____ Actual (Trial 2) _____

Tails _____ (your guess) Actual (Trial 1) _____ Actual (Trial 2) _____

When you put water drops on a penny, the drops pile up into a dome because of **surface tension**. Surface tension is produced by the force of attraction between water molecules. Within the liquid, each water molecule is attracted to its neighboring molecules, making them “stick” together. The water molecules at the top, however, “stick” only to the water molecules next to and below them. That’s because there are none above them. This unbalanced attractive force causes the water to act as if it had a thin “skin” on the surface. (Have you ever seen a bug sitting on top of a puddle? It is this skin-like quality produced by surface tension that allows small insects to rest on the water’s surface.) As you add more drops, the force of gravity becomes stronger than the force of attraction among the water molecules at the surface. This causes the water to spill over the edge of the coin.

Soap in the water breaks up the bonding nature of the water and lessens the surface tension. You will notice that no “bubble” forms as you drop the soapy water drops on the top of the penny. Rubbing alcohol is the same. The bonds between the molecules do not have the same force of attraction therefore the soapy water does not have the same surface tension as regular old water.

What leadership lessons can you learn from this experiment?

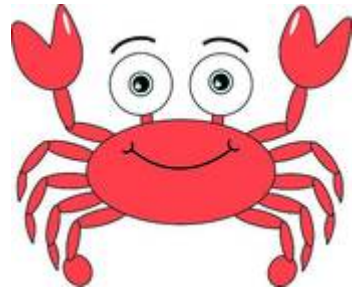
1. _____
2. _____
3. _____
4. _____
5. _____

Leadership Connections!!

- Surface Tension is an inward and downward pulling force. Each molecule of water is pulled equally by every other molecule in the liquid. Since the molecules at the top don't have others above it they are pulled inward and that is what helps create the domed look of the water on the penny. There are forces in our lives that pull us in a direction, too.
- What are some of the forces in your life right now that are pulling you in various directions? Are they positive forces or negative forces?
- Which way are you being pulled right now?
- When is it better to stick with the group and when is it better to break free from the pull of a group?
- Share the 'Stuck in a Bucket Crab Story' with the group. Choose an ending that is fitting for your group.
- Your thoughts...

"THE STUCK IN A BUCKET CRAB STORY"

A little boy and girl were on the beach building a sand castle and playing in the waves when they came upon a man who was fishing the surf. They asked him what he was catching and he replied that the sea was full of crabs and he was going to catch all that he could and then have a delicious dinner of crab legs and watermelon.



The children noticed that there were at least 7 crabs already in the bucket but it looked like they were trying to escape. The children thought that he might not have anything for dinner soon if he didn't put a lid on the bucket so they said, "You better put a lid on the bucket or all of the crabs you are going to have for dinner will escape."

The man replied, "Well, you see, when these crabs are in the bucket and one tries to crawl away, another crab will reach out with its pinchers and pull it back into the bucket. Because of that reason, I will have a delicious dinner tonight. None of my crabs will get away!"

And that's how it is with people. (now you get to choose your ending.)

Ending #1 – Sometimes we want to do something different and we try to get out of the bucket (our life as we know it.) But we might stray from the good values we were brought up with. We choose bad habits or hang out with the wrong people. It is good that we have this group/class/team/family to pull us back, to welcome us back into a loving and caring group.

Ending #2 – Sometimes we want to do something different – change a negative habit to a positive one, get better grades, get a better job, work towards reaching a goal, leave the environment that we are in – but there are always people who will try to pull us back and stop us from becoming something better. That is when we need extra strength to pull harder and get past those negative influences. That is when we need to dream those big dreams and go after them. Don't let others choose your fate and pull you back into the bucket!