Instructions for Lesson 4 Water Demonstration Kit

Walking Water:

Set aside the supplies you will need which are the 5 plastic cups (or 5 glasses or jars you may have), the three vials of food coloring (red, yellow & blue) and 4 sheets of the same type of paper towel. You will also need time for this demo to develop.

Fold each of the 4 paper towels lengthwise about 4 times so that you have nice long strips. Line your five cups, glasses or jars up in a line or an arc or a circle. Fill the 1st, 3rd, and 5th cup about 1/3 to ½ full with tap water. Leave the in-between cups empty. Add just a couple or a few drops of food color to the cups with water – no mixing colors, yet.

Put your strips of paper towel into the cups so that one end goes from a wet cup to a dry cup and that all cups are linked by paper towel bridges. Watch the water start to wick up the paper. This is capillary action which involves adhesion and cohesion properties of water. Keep watching. Check on the progress in a few hours and the next day. Take photos. What did your team observe? For more info and questions…

http://dig.abclocal.go.com/wtvd/docs/BASF-walking-water.pdf

Go deeper and get scientific and test the differences between the different types of paper towels you have in your kit (3), the different food colorings and different levels of water in your glass. Follow the directions here to wrap up your understanding of capillary action:

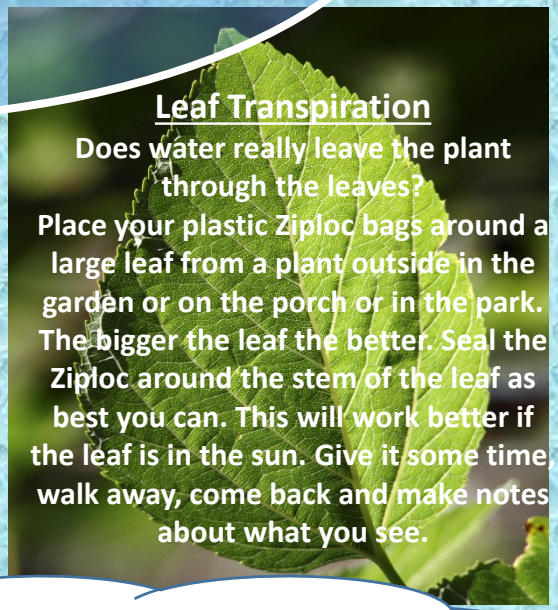
https://www.whsd.k12.pa.us/userfiles/1587/Classes/74249/capillary%20action.pdf

Capillary action in celery

Whatever you guys are getting paid for this, your celery isn't enough. Keep up the good work. Take your celery stalks, slice off a just a little bit from the base so that you have fresh surface and nice xylem to work with. Maybe freshen up the top too, that might help. Place celery in any color of water you like. A half full cup is fine. Let it be and watch what happens over time. Note the changes. Perhaps you will cut open or dissect the celery to see what changes happened inside. See the xylem?

Bending Water

Find the balloons in the bags? Good. Time for some fun. Blow up a balloon. Rub it on your head or the carpet. See and feel the static electricity. Now turn on a thin stream of water from a faucet. Rub balloon on head or carpet again and see if you can bend the water. Water responds to electric charges!



Leaf Transpiration

Does water really leave the plant through the leaves?

Place your plastic Ziploc bags around a large leaf from a plant outside in the garden or on the porch or in the park. The bigger the leaf the better. Seal the Ziploc around the stem of the leaf as best you can. This will work better if the leaf is in the sun. Give it some time, walk away, come back and make notes about what you see.

Check out this YouTube video with cool water tricks:
https://www.youtube.com/watch?v=rSjehgWWa2U
You can try a couple using your bottle of purified water and balloons too.

For "challenger" experiments, see the next page

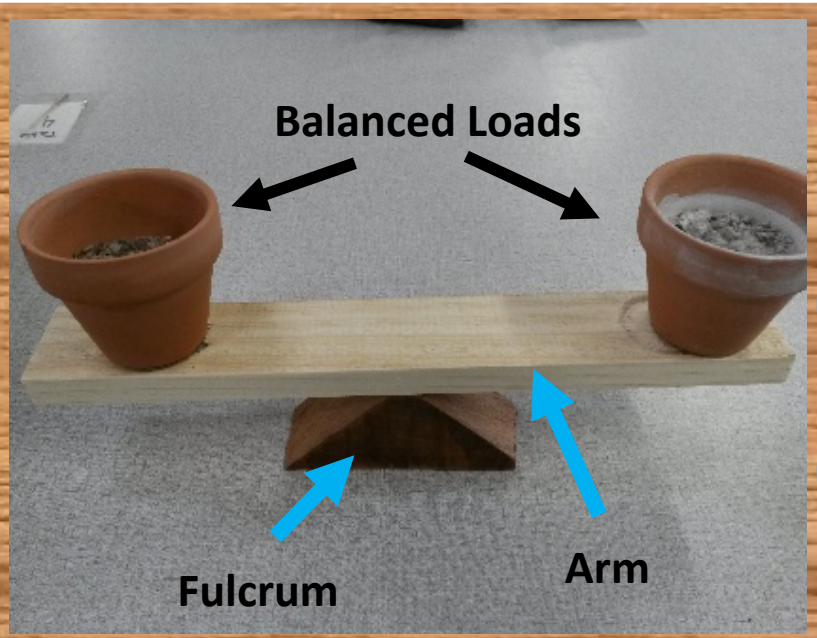
Strive for balance
With these water/soil experiments.

Clay, potting soil & sand

You will find three bags of soil in your kit. Put aside the bag of potting soil which is the bag that is mostly filled. The clay is chalky in color and texture. The sand looks like sand ☺ First, fill a pot with the clay soil halfway to 2/3 or so full. Next, put about the same amount of sand in the other pot and try to make them balance on your scale by adding or subtracting sand. When the pots are balanced does it look like the same amount of soil is in each pot? What does this say about density?

Now for the experiment with your balanced pots of clay and water. If they aren't balanced when sitting in the cups and the fulcrum in the middle, add/subtract sand until they do balance. Now add 1 tablespoon of water to each. Are they still balanced? Okay, turn on an oven or toaster-oven to 250°F and put the pots inside. At 30 minutes, 1 hour, and longer if you have time, remove pots and place on the balance. Do they still balance? The heat from the oven speeds up evaporation. Do the pots containing clay and sand appear to evaporate at the same rate? What's going on here?

Congratulations on your new balance. A balance is a lever that can weigh things by balancing an object with a known weight. Or you can compare the weight of different objects. Or you can just play with it and learn how a lever works. Does your arm balance when the fulcrum is placed in the middle? Go ahead and mark the middle of your arm where it should balance on the fulcrum. If you place a pot in the cup on each end, do they balance? Do you have to nudge the pots to make them balance? Maybe shift the fulcrum? Have fun with it.



Finally, the last experiment from your Lesson 4 Water Demonstration Kit. This one will take a while, it's a long-term experiment like we do in agriculture at the Kearney research station. Okay, take your pumpkin seeds and put them in a cup. Pour enough of the water from your bottle of purified water to cover the seeds. Let them soak for one to two hours. In the meantime, fill your pots with the potting soil. When it is time, place 2-3 seeds per pot with the pointy end up in the soil so that the point is just covered. Label one pot "pure", another "low-salt" and the last one "high-salt". Measure a tablespoon of pure water and water the matching pot. Next take a small pinch of salt between your fingers and mix with a tablespoon of water. This will go into the "low-salt" pot. Then take two small pinches of salt and with TBSP of water, mix and add to the "high-salt" pot. Repeat this process whenever the soil looks and feels dry. Perhaps team members will share the pots. Do all the seeds germinate within 4 days? Make observations about the pumpkin seedlings. How does a little bit of salt seem to affect the plants?