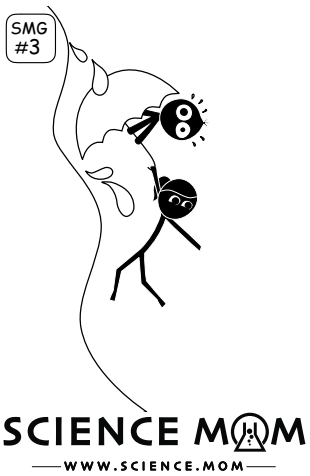
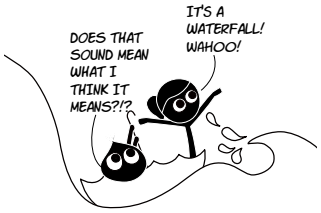


SCIENCE MOM'S
Guide to WATER, Part 3



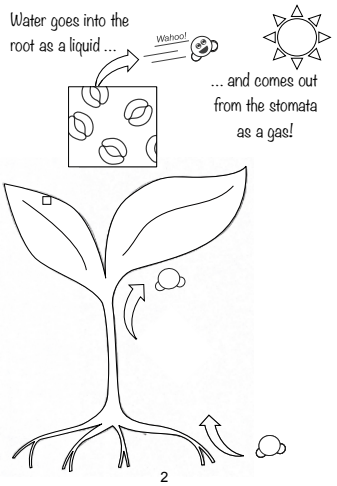
Did you know that plants release water through tiny holes in their leaves?

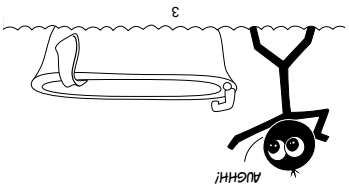
Water enters the plant at the roots and is drawn up through tiny tubes called **xylem**.

When it gets to the leaves, water evaporates out through small holes or pores called **stomata**, which can be opened or closed.

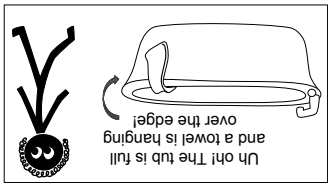
COOL FACT:

Plants can only get the air they need (CO_2), if their stomata are open. Since their stomata can only be open if they have enough water, that means plants can only breathe when they have water. A wilting plant is, essentially, trying to stay alive by holding its breath.





THE NEXT DAY ...

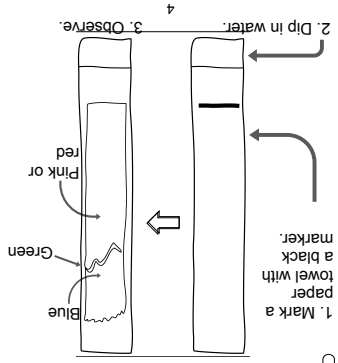


Plants aren't the only things that can move water. Cloth can also wick water from one location to another.

1. Chromatography

Is black ink really black?

Find out with paper towel chromatography!



2. Walking Water

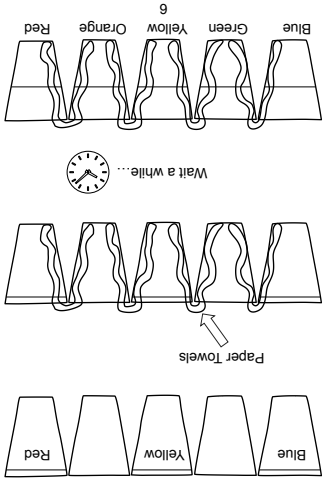
Materials:

- 5 cups
- 4 paper towels
- Food coloring
- Water

Method:

a) Fill 3 cups with water and leave 2 cups empty. Arrange them in an alternating pattern and color the water red, yellow, and blue.
b) Place the paper towels in the cups so that each towel is half way in a full cup of water and halfway in an empty cup.
c) Observe.

Hint: For each set of cups, use ½ or ¼ of a paper towel and fold it up to make a narrow strip.



3. Straw siphon

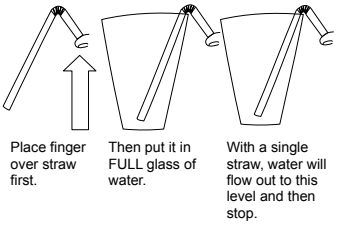
Materials:

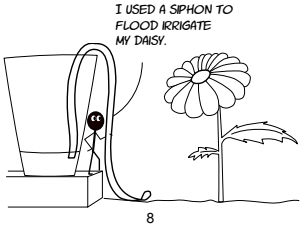
- Bendable drinking straws
- Cup
- Water
- Tape or plastic tubing (optional)

Method:

a) Fill cup to brim with water.
b) Put finger over top of straw to seal in the air.
c) Submerge the straw into the cup so that the bend of the straw rests on the rim of the cup.
d) Release thumb from straw and watch the water flow.

Tip: To make a siphon that can empty the whole cup, use tubing or carefully join two straws together with tape.





HOW DOES IT WORK?

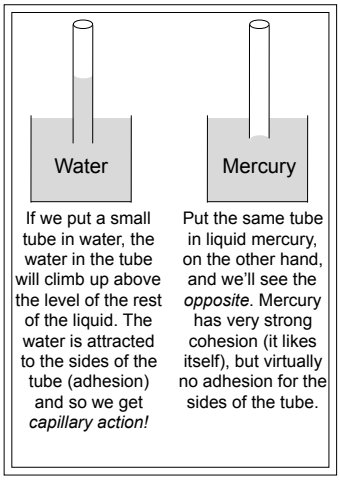
Capillary Action.

Another cool property of water.

Because water likes to stick to itself and other surfaces, it can flow through small spaces all on its own without the help of pumps or gravity.

Siphons work because of physics. The water is still flowing downhill, even if it goes up over a bump to get there. But with the help of capillary action, water really can flow UPHILL.

Capillary action exists because of adhesion: water being attracted to other surfaces. It plays an important role in both biology (ever heard of capillaries?) and geology (frost wedging and weathering!)

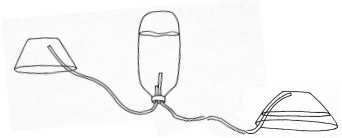


If we put a small tube in water, the water in the tube will climb up above the level of the rest of the liquid. The water is attracted to the sides of the tube (adhesion) and so we get *capillary action!*

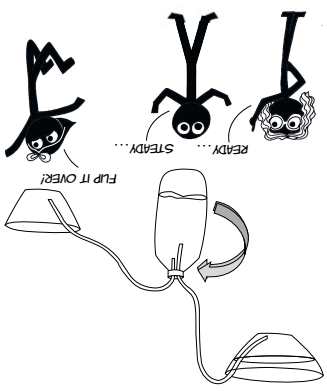
Put the same tube in liquid mercury, on the other hand, and we'll see the *opposite*. Mercury has very strong cohesion (it likes itself), but virtually no adhesion for the sides of the tube.

Method:

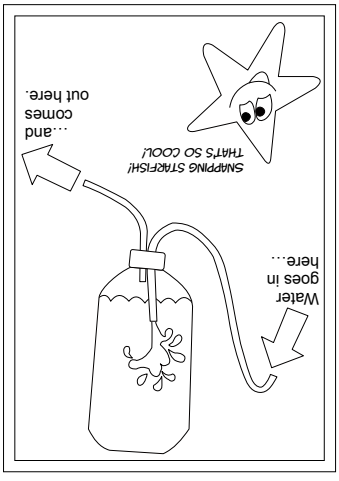
a) CAREFULLY make two holes in the lid using the scissors, knife, or drill.
b) Put the two pieces of tubing into the bottle lid with one tube being much taller than the other.



c) Use glue and/or tape to seal around the tubing. It needs to be airtight. If there's a leak in the lid, then the fountain won't work.
d) Fill the bottle with enough water to cover the shorter tube and screw on the lid.
e) Place the taller tubing in a bowl or pot of water that is higher than the bottle and put the other end where the water can drain.
f) Flip the bottle upside down and watch the fountain work!



Tip: For some extra fun, color the water in the bowl. Then your fountain will change color!



B A A X

B C C D

F E E D

L G G X