DRY ERASE

You will need:

- A glass plate, bowl or picture frame
- Dry erase marker
- Water

Instructions:

1. Draw a simple picture on the glass. A stick figure is a good one to start with
2. Pour water onto the plate or into the bowl slowly to lift up the drawing
3. Swirl the water around to make the picture dance and move

Why does this happen?

The marker leaves behind mixture of pigments and a type of alcohol mixed together. The alcohol dissolves and the pigments are left behind as a solid. Glass is so smooth that the solid slides right off when it gets wet!

MAKE YOUR OWN ROCK CANDY

You will need:

- A wooden skewer
- A clothes pin
- 1 cup of water
- 2-3 cups of sugar
- A tall narrow glass or jar

Instructions:

1. Clip the wooden skewer into the clothespin so that it hangs down inside the glass and is about 1 inch (2.5 cm) from the bottom of the glass. (as shown)
2. Remove the skewer and clothespin and put them aside for now. Get a helpful adult!
3. Pour the water into a pan and bring it to boil.
4. Pour about 1/4 cup of sugar into the boiling water, stirring until it dissolves.
5. Keep adding more and more sugar, each time stirring it until it dissolves, until no more will dissolve. This will take time and patience and it will take longer for the sugar to dissolve each time. Be sure you don't give up too soon. Once no more sugar will dissolve, remove it from heat and allow it to cool for at least 20 minutes.

NOTE: While it is cooling, some people like to dip half of the skewer in the sugar solution and then roll it in some sugar to help jump start the crystal growth. If you do this, be sure to let the skewer cool completely so that sugar crystals do not fall off when you place it back in the glass.

6. Have your friendly ADULT carefully pour the sugar solution into the jar almost to the top. Then submerge the skewer back into the glass making sure that it is hanging straight down the middle without touching the sides.
7. Allow the jar to fully cool and put it someplace where it will not be disturbed.
8. Now just wait. The sugar crystals will grow over the next 3-7 days.

Why does this happen?

When you mixed the water and sugar you made a super saturated solution. This means that the water could only hold the sugar if both were very hot. As the water cools the sugar "comes out" of the solution back into sugar crystals on your skewer. The skewer (and sometimes the glass itself) act as a "seed" that the sugar crystals start to grow on. With some luck and patience, you will have a tasty scientific treat!

MAGIC KETCHUP

You will need:

- A 1 liter plastic bottle or a water bottle
- Ketchup pack from a fast food restaurant
- Salt (using Kosher salt helps keep the water from becoming foggy)

Instructions:

1. Remove any labels from the bottle and fill it all the way to the top with water.
2. Add a ketchup pack to the bottle.
3. If the ketchup floats, you're all set – go to step 4. If the ketchup sinks in the bottle, go to step 5.
4. For the floating ketchup pack simply screw the cap on the bottle and squeeze the sides of the bottle hard. If the ketchup sinks when you squeeze it, and floats when you release it, congratulations, you're ready to show it off. If it does not sink when you squeeze it, try a different kind of ketchup pack or try a mustard or soy sauce pack.
5. If the ketchup pack sinks, add about 3 tablespoons (45 ml) of salt to the bottle. Cap it and shake it up until the salt dissolves. (Kosher salt will keep the water from getting too cloudy, although it will usually clear up over time if using regular table salt.)
   Continue adding salt, a few tablespoons at a time until the ketchup is just barely floating to the top of the bottle.
   Once it is consistently floating, make sure the bottle is filled to the top with water, and then cap it tightly.

6. Now squeeze the bottle. The magic ketchup should sink when you squeeze the bottle and float up when you release it. With some practice you can get it to stop in the middle of the bottle.

Why does this happen?

This experiment is all about buoyancy and density. Buoyancy describes whether objects float or sink. This usually describes how things float in liquids, but it can also describe how things float or sink in and various gasses.

Density deals with the amount of mass an object has. Adding salt to the water adjusted the water's density to get the ketchup to float. Sound complicated? It is, but here's the basics on the ketchup demo…there is a little bubble inside of the ketchup packet. As we know bubbles float, and the bubble in the ketchup sometimes keeps the heavy packet from sinking. When you squeeze the bottle hard enough, you put pressure on the packet. That causes the bubble to get smaller and the entire packet to become MORE DENSE than the water around it and the packet sinks. When you release the pressure, the bubble expands, making the packet less dense (and more buoyant) and, alas, it floats back up. This demonstration is sometimes known as a CARTESIAN DIVER

1. Do different food packs (ketchup, mustard, soy sauce) have the same density?
2. Does the temperature of the water affect the density of the ketchup packet?
3. Does the size of the bottle affect how much you have to squeeze to get the packet to sink?

EGGSHELL GEODE CRYSTALS

You will need:

- Clean eggshells
- Water
- A variety of soluble solids: table salt, rock salt, sugar, baking soda, Epsom salts, sea salt, borax, or cream of tartar
- Small heat proof containers (coffee cups work well)
- Spoons
- Food colouring
- Egg cartons and wax paper or mini-muffin tins

Instructions:

1. Crack the eggs for this project as close to the narrow end as possible. This preserves more egg to use as a container for the solution.
2. Clean the eggshells using hot water. The hot water cooks the lining and allows you to pull the skin (egg membrane) out of the inside of the egg using your fingers. Make sure to remove all the egg membrane, if any membrane stays inside the shell it is possible that your eggshell will grow mould and your crystals will turn black.
3. Use an egg carton lined with waxed paper or mini-muffin tins to hold the eggs upright.
4. Use a saucepan to heat the water to boiling.
5. Pour half a cup to a cup of water into your heatproof container. If you poured half a cup of water into the container, add about a ¼ cup of solid to the water. Stir it until it dissolves. Likewise, if you used a cup of water, add about ½ a cup of solid to the water. You wanted to add about half again the volume of the water as a solid to the mixture. When the initial amount of solid is dissolved continue adding small amounts of the solid until the water is super-saturated. Super-saturated simply means the water has absorbed all it is able to absorb and any solid you add will not dissolve.
6. Add food colouring.
7. Carefully pour your solution into the eggshell, filling it as full as possible without over-flowing it or causing it to tip.

Find a safe place to put your shells while the water evaporates. Crystals will form inside the eggshells as the water evaporates.

Why does this happen?

Dissolving the crystals in hot water created what is called a “super-saturated solution.” This basically means that the salts took advantage of the energy of the hot water to help them dissolve until there was no more space between the molecules in the solution. As the solution cooled, the water lost its energy and the crystals are forced from the solution to become a solid again. Since this happens slowly along with the evaporation, the crystals have time to grow larger than they were when the experiment started. Natural geodes in rock are form in much the same way as mineralize water seeps into air pockets in rock. This is also how rock candy crystals are formed.