Taste Test Challenge

Apparatus:

- A small piece of peeled potato
- A small piece of peeled apple (same shape as the potato so you can't tell the difference)

Method:

- Close your eyes and mix up the piece of potato and the piece of apple so you don't know which is which.
- Hold your nose and eat each piece, can you tell the difference?

Results:

Holding your nose whilst tasting the potato and apple makes it hard to tell the difference between the two. Your nose and mouth are connected through the same airway which means that you taste and smell foods at the same time. Your sense of taste can recognize salty, sweet, bitter and sour but when you combine this with your sense of smell you can recognize many other individual 'tastes'. Take away your smell (and sight) and you limit your brains ability to tell the difference between certain foods.

Ping Pong Ball on a String Experiment

Apparatus:

- A Ping Pong Ball.
- String
- Tape
- Running water.

Method:

- Tape the string to the ball.
- Turn on the water tap.
- Hold the string and dangle the ping pong ball in the running water.
- Which way does the ping pong ball move, towards or away from the running water?

Results:

A mathematician called Bernoulli found that fast moving fluids have a lower pressure than the surrounding environment.

He also found that water running over a curved surface creates the same low pressure.
So, why did the ball move toward the water stream? Fluids (and air) want to move from high pressure areas into low pressure areas. You created a situation where the wet side of the ball had lower pressure compared to the dry side of the ball. The high air pressure on the dry side of the ball pushed the ball into the low pressure water stream.

Ping Pong Ball and a Hairdryer Experiment

Apparatus:
- At least 1 ping pong ball (2 or 3 would be great)
- A hair dryer

Method:
- Plug in the hair dryer and turn it on.
- Put it on the highest setting and point it straight up.
- Place your ping pong ball above the hair dryer and watch what happens.
- Start to twist the hairdryer to the side slowly and smoothly.

Results:
This is a great demonstration of Newton's laws. The air from the hairdryer pushes up, the gravity from planet Earth pulls down and the ball sits at the point where those two forces are equal!
As you twist the hairdryer over to its side how come the ball doesn't fall? That all comes down to Bernoulli again! The air forms a stream around the ball and as you twist the hairdryer over you may well notice the ball start to spin - that's because of its position in the airstream.

(This is the same effect that you see when football players curl free kicks, the spinning of the ball and the change of airflow caused the ball to swerve to the side).

With a Wink and a Hop Experiment

Apparatus:

- A pen or pencil
- A cup of water
- An empty tube (an old paper towel tube is good)

Method:

- Write ‘left’ or ‘right’ next to each task depending on what side you used/favoured.
- When you’ve finished all the challenges review your results and make your own conclusions about which is your dominant eye, hand and foot.
- Which eye do you use to wink?
- Which eye do you use to look through the empty tube?
- Which hand do you use to write?
- Pick up the cup of water, which hand did you use?
- Run forward and jump off one leg, which did you jump off?

Results:
Around 90% of the world’s population is right handed. Why most people favour the right side is not completely understood by scientists.

Some think that the reason is related to which side of your brain you use for language. The right side of your body is controlled by the left side of your brain which also controls language for most people. Others think the reason might have more to do with culture. The word ‘right’ is associated being correct and doing the right thing while the word ‘left’ originally meant ‘weak’.

It’s not strange to find people who favour the opposite hand and foot (e.g. left hand and right foot). Some people are lucky enough to be ambidextrous, meaning they can use their left and right sides with equal skill.

Oil and Food Colouring Experiment

Apparatus:

- Water
- A transparent cup
- Vegetable oil
- Food colouring
- Alka-Seltzer (or other tablets that fizz)

Method:

- Pour water into the cup until it is around one quarter full.
- Pour in vegetable oil until the cup is nearly full.
- Wait until the oil and water have separated.
- Add around a dozen drops of food colouring to the bottle (choose any colour you like).
- Watch as the food colouring falls through the oil and mixes with the water.
- Break an Alka-Seltzer tablet in half and drop it into the glass.

Results:
The oil and water separate from each other, with oil on top because it has a lower density than water. The food colouring falls through the oil and mixes with the water at the bottom.

The piece of Alka-Seltzer tablet releases small bubbles of carbon dioxide gas that rise to the top and take some of the coloured water along for the ride. The gas escapes when it reaches the top and the coloured water falls back down.

The reason Alka-Seltzer fizzes in such a way is because it contains citric acid and baking soda (sodium bicarbonate), the two react with water to form sodium citrate and carbon dioxide gas (those are the bubbles that carry the coloured water to the top of the bottle).

Adding more Alka-Seltzer to the bottle keeps the reaction going so you can enjoy your lava lamp for longer. If you want to show someone later you can simply screw on a bottle cap and add more Alka-Seltzer when you need to. When you've finished all your Alka-Seltzer, you can take the experiment a step further by tightly screwing on a bottle cap and tipping the bottle back and forth, what happens then?

Orange Drop Challenge

Apparatus:

- Orange (you could replace the orange with an egg)
- An empty tube (an old paper towel tube is good)
- Dish
- Glass of water

Method:

- Pick a sturdy table or counter surface to perform the demonstration.
- Fill the drinking glass about three-quarters full with water and centre the dish on top of the glass.
- Place the cardboard tube vertically on the dish, positioning it directly over the water.
- Carefully set the egg on top of the cardboard tube.
- Pull the dish away with a sharp tug.

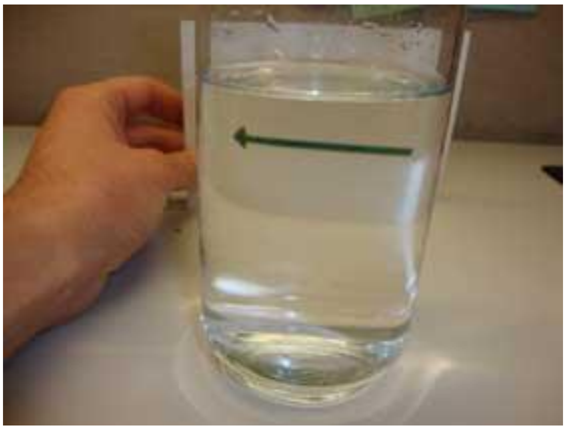
Results:

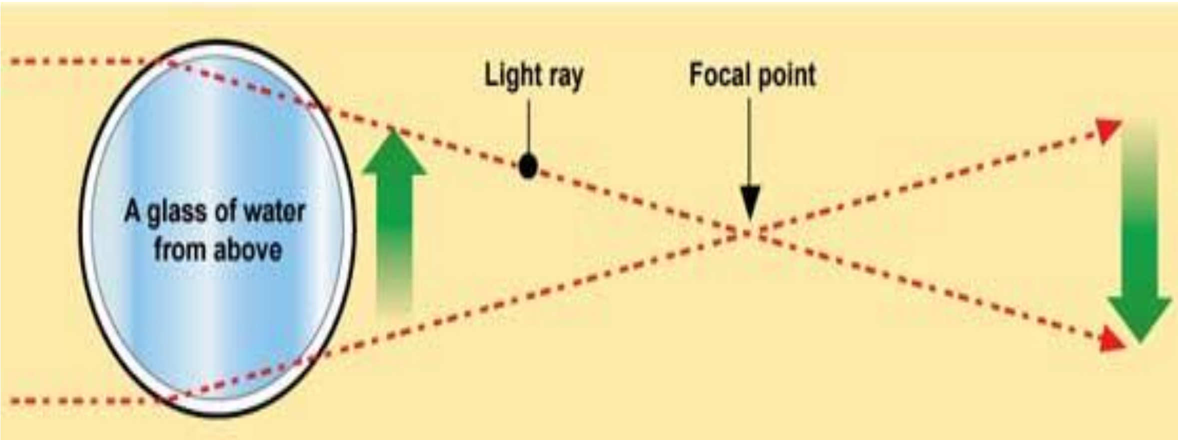
Isaac Newton said that objects in motion want to keep moving and objects that are stationary want to stay still -unless an outside force acts on them.

Since the orange is not moving while it sits on top of the tube, that's what it wants to do -not move.

You applied enough force to the dish to cause it to whip out from under the cardboard tube (there's not much friction between the surface of the pan and the water container). The edge of the dish knocked the bottom of the tube which fell away too. Basically, you knocked the support out from under the orange. For a brief nanosecond or so, the orange didn't move because it was already stationary (not moving). But then, as usual, the force of gravity took over and pulled the orange straight down into the cup. Also, according to Newton's First Law, once the orange began moving, it didn't want to stop. The container of water interrupted the orange's fall, providing a safe place for the orange to stop moving so you could recover it.

Follow the Arrows Experiment





Apparatus:

- A glass
- Water
- A note card
- A marker

Method:
- Fill your glass of water.
- Draw a horizontal arrow on a note card.
- Put the note card behind the glass of water and slowly move the note card back.
- Look through the glass from the front and observe the arrow. What appears to happen to it?

Results:

When light passes from one material to another, it can bend or refract.

You must also think of the glass of water as a magnifying glass. When light goes through a magnifying glass all of the light bends toward the centre. Where the light all comes together is called the focal point. Beyond the focal point, the image appears to reverse because the light rays that were bent pass each other and the light that was on the right side is now on the left and the left on the right, which makes the arrow appear to be reversed.

Bubble Experiment

Apparatus:

- Washing-up liquid
- Water
- Poster paint
- Cup
- Straw
- Paper

Method:

- Gently mix half a cup of washing-up liquid and two cups of water in a jug.
- Half fill a tray with the bubble mix and squeeze in some poster paint or ink.
- Stir it all together.
- Take a straw and gently blow into the mixture.
- What happens?
- Stop when the bubbles are just above the rim.
- Place a piece of paper on top of bubbles then lift it up.
- Repeat for different layers of colour.
- What do you notice about the bubbles that you make?

Results:

Similar to the way we perceive the colours in a rainbow or an oil slick, we see the colours in a bubble through the reflection and the refraction of light waves off the inner and outer surfaces of the bubble wall. You can't colour a bubble since its wall is only a few millionths of an inch thick. A bubble reflects colour from its surroundings.

It is the water in the bubble that holds the paint and transfers it to the paper. The bubbles remain clear.

Colourful Milk Experiment

Apparatus:

- A shallow dish – a clear dish works best as you can clearly see what is happening beneath the surface.
- Food colouring in four different colours.
- Milk with high fat content – Half-and-half or whole milk work best.
- Liquid dishwashing soap
- A toothpick

Method:

- Pour milk into the dish to just cover the bottom.
- Add one drop of each of the food colouring to the milk. The drops should be placed close together near the centre of the dish.
- Touch the coloured milk at the centre of the dish with the tip of the toothpick. Do not stir the mixture.
- Put a drop of the dish soap at the other end of the toothpick.
- Place the soapy tip of the toothpick back at the centre of the milk and hold it there for 10-15 seconds.
- Add another drop of soap to the toothpick and place it at the edge of the plate.

Results:

The principle at work here is surface tension. When you touch the milk without the soap, nothing happens. The drops of food colour, being less dense than milk, just sit on the surface where you placed them. Since you did not stir, they do not mix with each other much.

When you touch it with soap, the surface tension of the milk reduces. This allows the particles of water at the surface to spread out more. As they spread out, they push the food dye so that they spread out and merge together creating patterns.

Baking Soda Balloon Experiment

Apparatus:
- Baking soda
- Vinegar
- Balloon
- Plastic bottle
- Funnel

Method:
- Use a funnel to a third of a cup of baking soda to the inside of a balloon.
- Fill a plastic bottle with approximately one cup of vinegar.
- Attach the balloon to the mouth of the plastic bottle then lift the balloon upright so that the baking soda falls inside of the plastic bottle.

Results:
The vinegar and the baking soda mix together to make an acid-base reaction. The reaction creates carbon dioxide gas that bubbles up from the mixture. The gas expands up and out of the bottle and inflates the balloon.

Another cool thing about these balloons is that carbon dioxide is heavier than air so when you drop the balloon, you'll notice that it falls to the ground faster than a regular balloon filled with air!