Global Citizenship Marine Environment

Science experiments

Science experiments are a lot of fun! Students can learn important skills such as problem solving, critical thinking, and decision making. Through hands-on activities your students can also practice asking questions, observing, recording data, analysing the results, and drawing conclusions. These skills can help your students in all areas of their learning including reading and writing.

This document contains four science experiments based on topics related to the Global Citizenship Marine Environment theme. Each experiment is aimed at a certain age group, but your group of students may enjoy running all four experiments.

Part of the Green-Schools seven step process is to inform and involve. The older students on your Green-Schools committee could run the experiments and describe the process to the younger classes in the school. Research has shown that students enlisted to teach others work harder to understand the material, recall it more accurately and apply it more effectively (known as 'the protégé effect'). You could also set up an experiment show and tell as part of your Green-Schools Action Day.

Junior- Senior infants

Frozen Ocean Animal rescue

Water is a liquid, but once it reaches 0°C, it turns into a solid. This solid is called ice. In this experiment, students will try to physically break up, or melt the ice to free the marine animals. Salt sprinkled on the ice cube lowers the ices freezing temperature and, since the ice can't get any colder than it already is, it starts to melt. A little pool of water forms on top of the ice, and drips down to create a pool of water under the ice. This activity also allows for the discussion of different type of marine animals and some fun facts about them (i.e. This is a whale. Whales are the largest animals in the world)

What you need:

- A large bowl
- Plastic marine animals
- Plastic plants
- Shells/stones
- Blue food colouring
- Water
- Salt
- Pouring jugs/ squeeze bottles/ spray bottles
- Utensils: Forks, spoons, tongs, tweezers etc.

The experiment:

1. Place some marine animals, plants and shells/stones into the bowl.
2. Cover these items with water and allow to freeze.
3. Repeat steps 1-2 two more times to allow the items to freeze in layers.
4. Remove the bowl from the freezer and place the mound of ice in a large basin.
5. Fill the pouring jugs/ squeeze bottles/ spray bottles with water and place then beside the basin, along with a bowl of salt, and the utensils.
6. Before getting started, discuss what creatures are found in the ice. Is the ice cold/hot? Smooth? Rough?
7. Allow the students to get to work to 'free' the animals.
8. Ask the students to discuss what happens if you pour water on the ice. What happens if you sprinkle salt on the ice?
9. Flip the ice block over to see what is happening on that side too.

1st-2nd class

How do penguins stay dry?

Penguins are seabirds that are known for their black back and white tummy. They live mostly in the water, so they have flippers rather than wings. Penguins can stay in the water for five months at a time, sleeping and eating in the water. It's important that penguins have a way of staying warm in cold and icy water.

Penguins are covered in feathers that are tightly packed together. These feathers have an oil-producing gland that makes their feathers waxy. The wax on the feathers repel the cold water and help keep them dry.

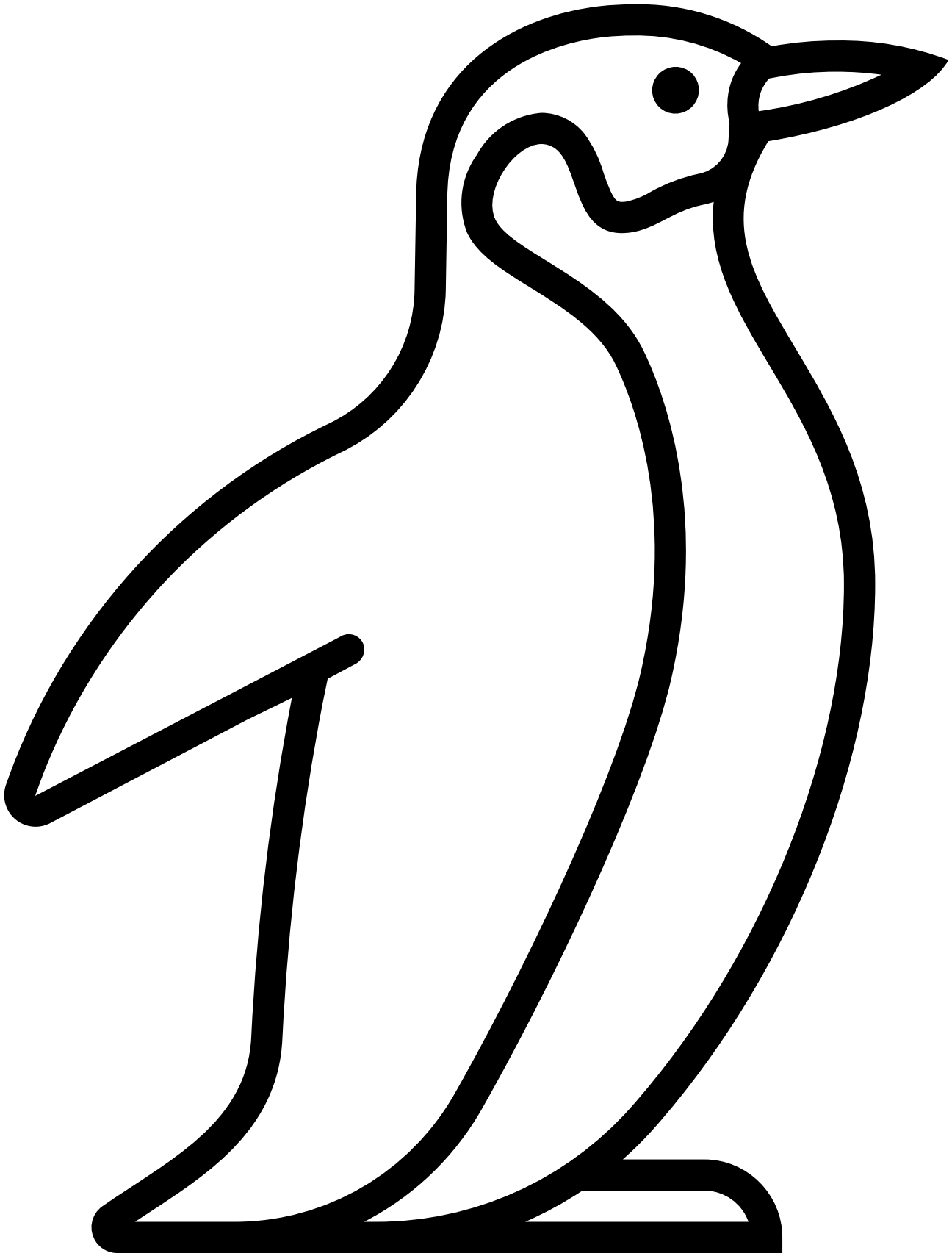
Video on penguins: https://www.youtube.com/watch?v=lAJB-dKTAQM

What you need:

- Wax crayons
- Spray bottle
- Blue food colouring (optional)
- Print out of penguin (below) on card or draw your own penguin!

The experiment:

1. Colour in your penguin with the crayons. Make sure you colour it with a thick layer of crayon. You could colour it twice to ensure full coverage!
2. Spray the penguin with the water. Just spray once or twice, not to soak the card.
3. Observe what happens (the wax repels the water and droplets form)
4. Discuss with students how the wax from the crayon prevents the water from absorbing into the card just like how the wax on a penguin's feathers repels the water and helps keep the penguin warm and dry.



3rd-4th class

Gummy Bear Experiment

This experiment looks at the movement of water in and out of things (in this case, gummy bears). Water is a very important part of planet Earth. Living things like plants, fish, animals and humans are made up of at least 60% water. Water constantly moves around our body, carrying out vital processes, ensuring we stay healthy.

This experiment explores osmosis. This is a chemistry term, that describes the movement of water through a barrier. The barrier could be a plant roots in soil, cells in our body or fish skin cells in saltwater. Osmosis describes when water moves from a less concentrated solution to a more concentrated solution. Osmosis helps to achieve equilibrium. For example, it helps saltier things become less salty, or sugary things become less sugary, by adding more water.

I bet osmosis has happened right before your eyes, and you didn't even realise! When we sit in the bathtub or put our fingers in water for a while they get wrinkly. That is because of osmosis. The skin of our fingers absorb water and get expanded or bloated; leading to the pruned or wrinkled fingers.

What you need:

- A packet of gummy bear
- Four clear glasses (or jars/cups/bowls/ plastic containers)
- Salt
- Sugar
- Vinegar
- Water

The experiment:

1. Place a gummy bear in each of the four glasses.
2. Add the same amount of room temperature water to each glass.
3. Add a tablespoon of salt to the first glass.
4. Add a tablespoon of sugar to the second glass.
5. Add a tablespoon of vinegar to the third glass.
6. Leave the fourth glass as just water.
7. Discuss. Ask the students what they think will happen to a gummy bear in water. Will it dissolve? Will it shrink or grow? Will it fall apart? How long will it take?
8. Leave for 24 hours.
9. Remove the gummy bears from the glasses and compare differences between them, and between them and fresh gummy bears from the packet. Are they bigger? Smaller? Softer? Changed colour?
10. You could repeat this experiment using new liquids such as milk, apple juice, soapy water etc

Explanation:

When you drop a gummy bear into plain water, you'll see the bear grow and grow as water flows into the bear. Why? The water moves to even out the stuff dissolved in it. Outside the gummy bear, you have water with nothing in it. Inside the gummy bear (trapped inside those pockets in the gelatine), you have water and sugar. There's more stuff inside the bear, so the water moves into the bear to try and make the proportion of sugar molecules to water the same in both places. (You can think about this like a sugar cube dissolving in a cup of water. If you let it sit for long enough, the water at the top of the cup will be as sweet as the water at the bottom.)

But the saltwater is different. You still have water and sugar inside of the bear. But outside of the bear, you have water and salt. Salt molecules are much smaller than sugar molecules, so more of them will dissolve in water. This means there's more stuff in the water than there is inside the bear. So this time the water moves out of the bear to try and even things out.

The sugar water is an interesting case because just like the salt, you have a lot of stuff dissolved in the water outside of the bear. But this time, we saw the water

flowing into the bear, not out. That tells us that there must be more sugar inside the bear than there is in the water outside.

The gummy bear put in vinegar expanded, but lost all of its gummy bear shape and just became a blob. The acid in the vinegar dissolved the gummy bear.

5th-6th class

Make your own plastic!

Did you ever think you could make your own environmentally friendly plastic? From milk?! Plastics are all similar, containing molecules that are repeated over and over again into a chain called polymers. Milk contains molecules of a protein called casein. When milk is added to an acid, such as vinegar, the pH of the milk changes. The pH change causes the casein molecules to unfold and reorganize into long chains, curdling the milk. The curds can then be kneaded and molded as casein plastic.

Casein plastic is extremely environmentally friendly, because it will break down and decompose over time. This is different to regular plastics, which are made from oil, and never breakdown or decompose. Casein plastic was first discovered in 1900, and has been used to make jewellery, buttons and fountain pens.

What you need:

- A microwaveable cup (a bowl, lunchbox, or any microwavable container will work)
- Milk
- Vinegar
- Spoon
- Paper towels
- Cookie cutters (optional)
- Food colouring (optional)

The experiment:

1. Pour milk into the microwaveable cup and heat in the microwave until hot (think hot chocolate temperature!).
2. Add 4 tablespoons of vinegar to the cup and stir. Curds (lumps) will begin to form immediately.
3. Layer paper towels, 5 to 6 sheets thick, on a table.
4. Spoon the curds from the cup onto the paper towels, draining off as much liquid as you can. Press additional papers towels on the curds to remove liquid.
5. The dried curd is plastic, called casein plastic.
6. Knead and mould the plastic into different shapes and figures (Make a fish! Make a spoon!). Use cookie cutters, or add food colouring, if you like. The plastic will need to rest for 48 hours until fully hard and dry.