**START Science Zimbabwe**

What follows below are the modules to be implemented in the pilot program for Project START (Students, Teachers, and Researchers Teach) Science.

**Module#1: Water Cycle in a Bowl**

**Purpose**

To demonstrate how the solar system, specifically the water cycle, produces fresh drinking water through desalination of seawater.

**General Description**

Water vapors are produced inside a bowl as the sun warms the water and it evaporates. The plastic wrap acts as a form of a greenhouse, trapping the vapour inside and causing humidity to rise to 100%. The top of the plastic wrap is much cooler because its in contact with the outside air. When the humid air inside rises and touches the top of the plastic wrap (the cooler area), the vapour condenses and forms water droplets on the undersurface of the wrap. As time passes the water droplets around the plastic wrap grow larger and flow to the center of the wrap where we have placed a weight. As the droplets join together , they grow heavier and eventually drop into the cup, located in the center of the bowl.

**Activity**:

Presentation

Earth's water is in constant motion, with no beginning and no end. The continuous movement of water is referred to as the water cycle .When water from oceans and other water bodies is heated by the sun, it evaporates. The vapor condenses into clouds and returns to earth in the form of rain or snow .As the water evaporates, the salt remains in the ocean. When the water returns to the earth through precipitation, it's fresh water that's free from salt.

**Procedure**

Pour hot tap water into the bowl so that it's about 0.5cm deep.

Add enough salt so the water tastes salty

Place a small beaker in the center of the bowl.

Cover the bowl top tightly with your plastic cling wrap. Ensure there are no open spots around the rim.

Place the bowl on a safe and clean place that gets sunshine.

Place the weight on top of the plastic wrap, right above the beaker .The weight should cause plastic wrap to sag in the center above the beaker. This step is essential to ensuring the water falls into the cup, so make sure it's right.

Wait until the beaker has some water in it.

You can pull back the plastic wrap and remove the beaker. Taste the water in the beaker.

Materials

Iodized salt, tap water, plastic cling wrap, a small weight, bowl, beaker, sun

**Module#2: Bending a Water Stream**

**Purpose**

To demonstrate how static electricity can be used to bend a water stream.

**Presentation**

Everyday we interact with and observe the effects of static electricity from multiple sources, none more so than the static created by our own bodies. When we brush our hair, rub our feet on the ground, or pull a wool sweater over our heads, we feel the power of static electricity more than ever. When a sustained separation of positive and negative charges occurs, static electricity is formed.

**Activity**

Inflate balloon

Allow water to come out of a burette at a slow and steady stream onto a table or floor.

Take the inflated balloon and rub it against a nylon comb to create a static charge on the comb.

Slowly and carefully place the teeth of your charged comb next to the stream of water. As the comb gets closer, the water stream reacts by bending towards the comb.

Materials

Burette, latex balloon, nylon comb

**Module # 3: Foam Tube Rollercoaster**

**Purpose**

To illustrate the conversion of energy – hands on!

**General Description**

The concept of energy is sometimes difficult to understand. How can Potential Energy turn into Kinetic Energy? It is often easier to understand the concept when you are at the top of a rollercoaster and then moving quickly on its downward slope. It is easiest to understand when you build the rollercoaster yourself.

**Activities**

Presentation:

Demonstrate the conversion of Mechanical Energy to Heat by rubbing your hands together.

Explain the concept of Potential Energy and how it can be converted to Kinetic energy.

Project:

Make it happen! Build rollercoasters in teams of four out of the foam rubbers. Use the tape and Popsicle sticks to stabilize the rollercoasters. See if you can make a loop-the-loop. What kind of conversion of energy occurs at the top of the loop? (Kinetic Energy to Potential Energy)

**Materials**

Popsicle sticks, foam tubes, marbles, tape

**Module #4: Breathing Yeast**

**General Description**

Yeast is a living fungus and respires as animals do. This means they use sugar and oxygen to make their energy, some water and some carbon dioxide. It should also be observed that the more sugar they have the more carbon dioxide they produce. In this module the students will test for the carbon dioxide produced.

**Activity**:

1. Pour a packet of dried yeast into a clear plastic bottle
2. Add some water to the bottle to so that the bottle is about a quarter filled
3. Add a teaspoon of sugar to the bottle and swirl the bottle around
4. Place a balloon over the mouth of the bottle so that it’s fully covered and there are no leaks
5. Place the bottle with the balloon in a large bowl of warm water
6. If you add more sugar, you should get more carbon dioxide

**Result**

After placing in the warm bowl of water, the balloon will “magically” blow itself up. The students will then test for the gas in the balloon.

**Materials**:

A sachet of baker’s yeast, teaspoon, sugar, warm water, lime water, large bowl