Science Experiment:
Super Shrinking Plastic!
Project:
Arts & Crafts, Science

Supplies:

- Various pieces of clean #6 plastic
- Permanent Markers
- Scissors
- Aluminum Foil
- Oven and Tongs or Oven Mitt

Time: 30 minutes

What to Do:

1. Everyone should begin by talking about their predictions. Talk about these in your groups to see what everyone thinks will happen.
2. Obtain pieces of clean #6 plastic (polystyrene). Just flip it over and look for a "6" inside the recycling arrows.
3. Cut any excess plastic away to make a flat sheet, or break the plastic up to make flat pieces.
4. Draw or write your desired image or text on your plastic canvas using permanent markers.
5. Pre-heat your oven to 350°, and place a rack in the lowest position. Create a "tray" out of the aluminum foil by bending up the sides.
6. Place your art in the tray, then use the tong or an oven mitt to place the foil on the bottom rack.
7. The pieces should be heated for about 3 ½ minutes or until they have flattened out after being heated.
8. Using the tongs or oven mitt, remove the tray. At this point, it's still pliable, so if you want to flatten it more, do so *carefully* within the first ten seconds.

Reflect:

1. What do you think will happen when the plastic is melted?
2. Compare the size of the plastic before and after it has been heated. Did your design change?
3. What can you do with the plastic after it has been heated?

Apply:

1. What does #6 plastic mean? Why should you only use that type of plastic?
2. What items are made with #6 plastic? How are they used compared to the other types of plastic?

Facilitator Notes:

1. The heat is changing the alignment of the polymer chains within the plastic. In the manufacturing process, a polymer resin is heated, extruded, rolled into flat sheets and then molded. This process aligns the polymers into an orderly patter, but the heat of the oven returns them to their naturally disordered, clumped state.
2. Only one type of plastic works well for projects like these. #6 plastic (polystyrene) has a lower melting point than other plastics which means other plastics have to be heated to nearly 500°F in order to melt the plastic and it doesn't look as pretty as #6 plastic.

Source: *http://familycrafts.about.com/od/craftsupplies/ss/How-To-Make-Shrink-Plastic.htm*

Science Experiment:
Cleaning Up an Oil Spill
Project:
Environment, Science

Supplies:

- Vegetable oil (yellow works best)
- Tablespoon
- Large clear bowl or container
- Water
- Spoon
- Cheesecloth or gauze
- Cotton balls
- Polypropylene cloth (sock liners work well)

Time: 30 minutes

What to Do:

1. Make a prediction about which item; cheesecloth, gauze, cotton balls, or propylene cloth will be best for removing the oil.
2. Pour water into the bowl or container until its about 1/2 way full.
3. Use the tablespoon and begin adding the vegetable oil until you have an oil slick on top of the water.
4. Next, try using the items, one at a time, to remove the oil from the water.

Reflect:

1. Note what occurs when the oil is added to the water.
2. Which one removed the most oil from the water? Least amount of oil?
3. Were your predictions correct?

Apply:

1. When you think about the uses for each of these products, why do you think there is a difference is the amount of oil that each soaks up?
2. How does this apply to every day uses of these products? How does this help us design new products?

Facilitator Notes:

1. Polypropylene and oil are both composed of carbon and hydrogen. Because of this, they are attracted to each other. Since water and oil are made of different elements – they are not attracted to each other. When oil and water are mixed together it becomes an immiscible solution. This means they cannot mix together and will forever separate into layers.
2. Polypropylene is utilized to gather oil spilled on water, a major ecological and environmental problem. Pol spills often harm wildlife and damage fragile ecosystems. Because polypropylene floats and absorbs oil, the spill can be removed fairly simply. Polypropylene, a synthetic type of cloth material, can be used for cold winter clothing such as gloves and sock liners.

Source: *http://weirdsciencekids.com/Oilspillexperiment.html*

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Science Experiment:
Build a Solar Oven
Project:
Foods, Arts & Crafts

Supplies:

- Cardboard pizza box
- Box knife or scissors
- Aluminum foil
- Clear tape
- Plastic wrap (a heavy-duty or freezer zip lock bag will also work)
- Black construction paper
- Newspapers
- Ruler, or wooden spoon
- Thermometer
- An adult to help with cutting

Time: 45 minutes

What to Do:

1. Use a box knife or sharp scissor to cut a flap in the lid of the pizza box. Cut along three sides, leaving about an inch between the sides of the flap and the edges of the lid. Fold this flap out so that it stands up when the box lid is closed.
2. Cover the inner side of the flap with aluminum foil so that it will reflect rays from the sun. To do this, tightly wrap foil around the flap, then tape it to the back, or the outer side of the flap.
3. Use clear plastic wrap to create an airtight window for sunlight to enter into the box. Do this by opening the box and taping a double layer of plastic wrap over the opening you made when cut the flap in the lid. Leave about an inch of plastic overlap around the sides and tape each side down securely sealing out air. If you use a plastic bag, cut out a square big enough to cover the opening, and tape one layer over the opening.
4. Line the bottom of the box with black construction paper – black absorbs heat. The black surface is where your food will be set to cook. How much you need will depend on the size of the pizza box you're using to make your solar oven.
5. To insulate your oven so it holds in more heat, roll up sheets of newspaper and place them on the bottom of the box. Tape them down so that they form a border around the cooking area. It may be helpful to also tape the rolls closed first. The newspaper rolls should make it so that the lid can still close, but there is a seal inside of the box, so air cannot escape.
6. Take the pizza box outside and adjust the flap until the most sunlight is reflecting off the aluminum foil and onto the plastic-covered window. Use a ruler to prop the flap at the right angle.
7. Place your food item inside to begin cooking. *Be careful not to cook items that may carry food borne illnesses as food safety is a concern.*
8. Reposition your solar oven when needed, so that it faces direct sunlight. You should be checking periodically on your oven to make sure it is in the sun.

Reflect:

1. What is happening inside of the box? How high does the temperature get inside of the box?
2. Why is sunlight important for cooking with a solar pizza oven?
3. Why is the angle of the box important for this process?
4. What items can be cooked or heated easily inside of the box?

Apply:

1. How can you take the ideas that you used from building this oven, and use it to solve a real world issue?
2. What redesigns would help make your product more "functional" for real world use?

Facilitator Notes:

1. The heat from the sun is trapped inside of your solar pizza oven and it starts getting very hot inside. Ovens like this one are called collector boxes, because they collect the sunlight inside. As it sits out in the sun, your oven eventually heats up enough to melt or heat up food items.
2. As the rays of light are coming to the earth at an angle, the foil reflects the ray, and bounces it directly into the opening of the box. Once it has gone through the plastic wrap, it heats up the air that is trapped inside. The black paper absorbs the heat at the bottom of the oven, and the newspaper makes sure the heat stays where it is, instead of escaping out the sides of the oven.

Source: *http://www.hometrainingtools.com/a/build-a-solar-oven-project*

Science Experiment:
Crayon Lip Gloss
Project:
Science, Arts & Crafts

Supplies:

- 2 tsp Coconut Oil
- Non-Toxic Crayons of various colors
- A double boiler or pan with a tiny glass bowl to place inside
- Paint containers w/lids to store your lipgloss inside

Time: 30 minutes

What to Do:

1. Choose the colors you want out of the various crayons.
2. Chop up your crayons into tinier pieces that make them easier to melt.
3. Add just enough water to cover the bottom of a pan and place on a stove on med-high heat. Add a small glass bowl or dish to the bottom. The water should not go into your dish. Place your crayon pieces and 2 tsp of Coconut oil in your bowl.
4. As the water heats up, it will heat up your bowl and melt your oil and crayons together. You can use a toothpick to swirl it around and mix it all together.
5. Remove from heat and remove the sauce pan carefully and then pour into your storage containers.

Reflect:

1. How do the ingredients work together to create lip gloss?
2. Why does it matter?

Apply:

1. What other items could you substitute to make lip gloss?
2. Why would you make lip gloss when you can buy it?

Facilitator Notes:

1. Wax can act as an emollient as well as protect your lips from the elements, but the most important role it plays is that it gives your lip balm its stiffness and body so that it can be easily transported and applied. Coconut oil will not coat and smother your skin like petroleum based products, and moisturizes deep down. Its fatty acids hold onto moisture, and can help reinforce the skin's lipid layer, which promotes hydration.

Source: *http://everydayroots.com/diy-lip-balm and http://www.raisinglifelonglearners.com/diy-crayon-lip-balm/*

Science Experiment:
Plantable Seed Paper
Project:
Environment, Floriculture, Garden

Supplies:

- Paper materials
- A frame
- Wire mesh
- Kitchen towels
- A rolling pin or glass jar
- A cake pan or container that is larger than the frame
- Blender
- Water
- Seeds of choice

Time: 30 – 45 minutes

What to Do:

1. Shred the paper into small pieces, and add to the blender. Add enough water to cover the paper, and blend until it reaches a thick, pulpy consistency. Add more paper or water as needed.
2. Place the wire mesh over the empty frame – you can attach it using a staple gun, or simply fold it around the edges of the frame. Place the frame in a shallow baking pan or container.
3. Pour the paper and water mixture over the wire frame, using your fingers to smooth it out evenly.
4. Lift the frame and place it over the pan to let any excess water drip freely. You can also use a towel to help press the water out of the paper mixture.
5. Remove the paper from the wire frame and lay it on a towel. Cover with the other towel and use the rolling pin or glass jar to further flatten and even out the paper.
6. Sprinkle the seeds over the paper while it is still damp, pressing them into the mixture so they'll stay in place when it dries. Place the paper on a drying rack or out in the sun and let it dry for about 24 hours.

Reflect:

1. Do plants need the same things that people need to grow and be healthy? How do we know what plants need?
2. Is the paper a good product to germinate seeds?

Apply:

1. Plantable paper is a biodegradeable paper that is made of post-consumer materials and embedded with seeds. When the paper is planted in a pot of soil, the seeds grow and the paper composts away. All that is left behind is flowers, herbs or vegetable, and no waste.

Source: *http://blog.freepeople.com/2015/04/plantable-seed-paper/?cm_mmc=broadcast-_-Q12015-_-150422_10825_superNatural-_-Recycle2*

Science Experiment:
Plastic Bottle Flowers
Project:
Home Environment, Arts & Crafts

Supplies:

- Empty plastic water bottles
- Scissors
- Acrylic paint
- Paintbrush
- 16 gauge floral stem wire
- Candle (with adult supervision)

Time: 1-1.5 hours

What to Do:

1. Start by removing the labels from your bottles. You can leave the caps on for now.
2. Next, use a sharp pair of scissors to cut around the top ring of the bottle. You are just going to use the top portion of the bottle. Recycle the rest.
3. For a five-petal flower, make five, evenly spaced cuts from the cut edge to as close to the spout as possible.
4. Fold down the petals, almost like you are turning the bottle inside out.
5. Use scissors to round off the edges of each petal.
6. Remove the bottle cap, but do not throw it away. If there is still a thin ring on your bottle that held the cap in place, remove it as well.
7. Set the flower on a protected surface, spout up. The petals should curve up like little cups. Apply one or two coats of acrylic paint to the petals. If you use more than one color, make sure that each section of paint is completely dry before you add the next color or they will smear. Let the paint dry. Seal your paint and add water resistance for outdoor use.
8. Replace the cap. There should be a small gap between the lid and the bottle where the protective ring used to be.
9. Gently heat the edges of the flower petals with the heat from the candle. Do not place the plastic in the flame or the plastic will burn. Let the flower cool completely.
10. To make the stem, wrap an end of the floral wire tightly around the gap beneath the lid. Straighten out the stem and place your flowers in a pot or the garden.

Reflect:

1. Did your plastic bottle turn into a flower?
2. What happened to the plastic when you heated the edges of the petals? Did anything happen to the paint?

Apply:

1. How can you use plastic bottles for other activities like this?
2. What is another project that you can do from recyclable materials that you can use in your house or room?

Facilitator Note:

1. Plastic bottles can be used for all kinds of fun activities. This is just one way to reuse empty bottles for a fun craft.

Source: *http://www.thechillydog.com/2014/07/craft-tutorial-plastic-bottle-flowers.html*

Science Experiment:
Seed Bombs
Project:
Garden, Environment, Floriculture

Supplies:

- Clay (available from craft stores)
- Compost or potting soil
- Seeds (easy-to-grow or native varieties)

Time: Varies

What to Do:

1. Divide your materials so you have:
   - 5 parts clay
   - 1 part compost/potting soil
   - 1 part seeds
2. Combine the clay and compost. Add a little water if your mixture is dry. The mixture should be moist but not dripping wet.
3. Add the seeds to the clay and compost. Thoroughly work the materials together with your hands.
4. Shape the mixture into a ball the size of a golf ball. You can either plant the seed bomb while it is still moist or allow it to dry. As long as it is watered (either manually or by rain) once it's planted, the clay will break down and the seeds will grow.

Reflect:

1. How does the clay and soil work in this project?
2. What would happen if the seed bomb has not been moistened upon planting?

Apply:

1. What type of plants would be good to plant by seed bombs?
2. Why would we need to use seed bombing as a planting procedure?
3. What types of plants would not thrive being planted in this style?

Facilitator Notes:

1. Seed bombing on a larger scale is done by introducing new vegetation to land by throwing or dropping (usually from an airplane) compressed bundles of soil containing live vegetation. This aerial revegetation dates back to the 1930s and is still used today to treat areas burned extensively by wildfires. On the home front, and a much smaller scale, seed bombs are fun to make and an inexpensive way to plant seeds.
2. Another way to make this activity more advanced. Have the youth plant seeds using both traditional and seed bombs. Have them count the number of plants that grow in each process. Have them chart the growth as well as the number of days. Is there any difference? Does it work better for different types of seeds verses others? Have them use their minds to come up with great research questions around this!

Source: *kidsgardening.org, The National Gardening Association*

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