Captain Starlight, here!

I just landed on Earth with some exciting news:

**Starlight Children’s Foundation** has partnered with the organization **CoachArt** to work together to add fun STEAM (Science, Technology, Engineering, Art, Math) lessons into all the activities! How cool is that?!

Over the next few weeks, I will lead you and your student through four action-packed lessons using these nifty curriculum guides!

Did you know kids learn best when they are having fun? That’s why I have thoughtfully sprinkled in a **STEAM** learning moment into each exciting lesson. Make sure you highlight those as you work your way through this curriculum guide.

If you have any questions throughout your mission, check out the Coach Corner website or email **match@coachart.org**.

**Now, buckle up and get ready to blast off in 3...2...1!**
**LEMON VOLCANO**

- **Age Group:** 5-10
- **Skill Level:** Beginner
- **STEAM:** Science
- **Adult Helper:** As needed
- **Learning Objective:** Students will understand what a chemical reaction is and the changes that can occur.

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If you could smell a volcano, what would it smell like? What would it taste like? Today is your lucky day, we are going to smell a volcano!

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**Here is what you need:**
- Lemons
- Baking soda
- Food coloring
- Dish soap
- Plate or bowl
- Fork

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**At the end of this module, students will be able to:**
- Demonstrate what happens when acid is mixed with a base.
Activity: Lemon Volcano

Here is what you do:

1. Adult Helper Assistance: Cut some lemons in half.
2. Place one half of a lemon onto a plate or bowl.
3. Using a fork, poke holes in the top of the lemon in different sections. This will help create the volcano eruption.
4. Place a few drops of food coloring around the top of the lemon. Hint: Use different colors in different sections if you want a colorful volcano, or just use one color if you prefer!
5. Next, add a few drops of dish soap across the top of the lemons.
6. Now, sprinkle a generous amount of baking soda on top.
7. Using a fork, press the baking soda down into the rest of the lemon.
8. Now watch as your lemon volcano erupts!

Bonus Challenge 🌟

Want a bigger reaction?
• Use the other half of the lemon and squeeze the juice onto the lemon volcano.

COACHES NOTES

- STEAM Question of the Week:
  • Why did the volcano erupt? Lemon juice contains citric acid, (the same stuff that makes Warheads candy sour). The citric acid reacts to the base, which is the baking soda. This chemical reaction creates a gas called carbon dioxide. The bubbling, fizzing carbon dioxide creates a rainbow of colors. This fizz also helps the dish soap create a more exaggerated eruption.

- STEAM Learning Term of the Week:
  • Carbon Dioxide: A colorless, odorless gas made of carbon and oxygen. This gas is in the air and is used in soft drinks. Dry ice is frozen carbon dioxide.
Rock Candy

- **Age Group**: 5-10
- **Skill Level**: Beginner
- **STEAM**: Science
- **Adult Helper**: As needed
- **Learning Objective**: Students will learn how sugar crystals are formed.

Today you are going to learn the sweet side of science. You will learn how cooling a substance over a period of a few days will result in a sweet chemistry treat you can eat.

**Activity One** 30 minutes  **Observation Time** 1 week  **Lesson** 10 minutes  **Coaches Notes** 10 minutes

**Here is what you need:**
- 1 cup water
- 4 cups sugar
- Mason jars
- String
- Edible glitter (optional)
- Food coloring
- Straws
- Meat thermometer
- Funnel or spouted measuring cup

**At the end of this module, students will be able to:**
- Grow sugar crystals.
Activity: Rock Candy
Here is what you do:

Step 1. The day before starting your sugar crystal experiment cut a piece of string a little longer than your jars. Tie one end of the string to a straw. Tie a knot in the other end. Get the strings wet and coat them in sugar. Let them dry overnight. The sugar becomes "seed crystals" on the string.

STEP 2. The following day add four cups of sugar and one cup of water to a saucepan and heat until boiling. This will form your saturated solution. Stir until the sugar is dissolved but be careful not to heat the sugar too much. Use a meat thermometer to keep the temperature right at 210 degrees. Remove the sugar from the heat.

STEP 3. Adult supervision is required. Pour the sugar mixture into the jars. Using a funnel or a spouted glass measuring cup will help prevent spillage of the hot liquid. Add edible food coloring to each jar and add some edible glitter if you have it.

STEP 4. Lower the string into the jar and place the jars in a safe place. Let sugar crystals form for at least a week. Congratulations, you made rock candy!

COACHES NOTES

- STEAM Question of the Week:
  - What is the science behind rock candy? Two processes help crystals grow on the string:
    - Supersaturation. First, you heated sugar and water to create a saturated sugar solution. Saturated means that's the maximum amount of sugar that can dissolve in that amount of water at that temperature. When you allowed the saturated solution to cool, it became supersaturated. A supersaturated solution is unstable and contains more solute (in this case, sugar) than can stay in a liquid form. The sugar starts to come out of the solution, forming a "chemical precipitate." It collects on the seed crystals on the string.
    - Evaporation. The water will evaporate slowly from the solution over time. As the water evaporates, the solution becomes more saturated and sugar molecules continue to come out of the solution and collect on the seed crystals on the string. These crystals grow molecule by molecule. Your finished rock candy will be made up of about a quadrillion (1,000,000,000,000,000) molecules attached to the string!

- STEAM Learning Term of the Week:
  - Chemical precipitation: The formation of a separable solid substance from a solution.
Today we are going to see what happens when we mix lava from a volcano with oil. What type of reaction do you think we will get? Grab your lab coats and let’s experiment!

Here is what you need:

- Clean plastic bottle, preferably with smooth sides and a cap
- Water
- Vegetable oil
- Effervescent (fizzy) tablet such as Alka Seltzer
- Food coloring

At the end of this module, students will be able to:

- Demonstrate how density works.
- Define Density.
Activity: Lava Lamp

Here are the basic guidelines:

- Fill the plastic bottle with water about 1/4 of the way up.
- Add vegetable oil to the bottle until it is almost full.
- Wait a few minutes for the oil and water to separate.

What is a Lava Lamp?

A lava lamp is a decorative light that was invented in 1963. The lamp, which is still popular today, has blobs of color that appear to be floating in space.

The Experiment

- Add a few drops of your favorite food coloring and watch what happens.
- Did your drops of color mix with the water immediately or float in between for a few minutes?
- Break your fizzy tablet in half, and drop half into the bottle.
- What happens?

SHARE YOUR EXPERIENCE

Enjoy your time together, and email your photos & stories to photos@coachart.org at "original" (maximum) size.
STEAM Question of the Week:

Why did the oil float?
The oil floated on top of the water because it is lighter than water. The food coloring has the same density as the water, so it was able to sink through the oil and mix with the water. When the fizzy tablet was added, it sank to the bottom, then started to dissolve. As it dissolved it made carbon dioxide, a gas. Gas (like air) is lighter than water, so it floated in bubbles to the top. The bubbles bring some colored water with them to the top. When the gas comes out of the bubble, the colored water sinks. This happens repeatedly until the tablet is completely dissolved.

STEAM Learning Term of the Week:

Density: The mass of a unit volume of a material substance.

Bonus One ✨
Want a bigger reaction?

- Grab a flashlight and turn off the lights.
- Add the other half of the fizzy tablet.
- Shine the flashlight through the lava lamp.
- What happens?

Bonus Two ⭐⭐

- What happens if you put the cap on the bottle after dropping the fizzy tablet in?
- What if you drop a whole fizzy tablet in?
- When it stops bubbling, try sprinkling some salt into your bottle. What happens?

COACHES NOTES

- STEAM Question of the Week:
  - Why did the oil float? The oil floated on top of the water because it is lighter than water. The food coloring has the same density as the water, so it was able to sink through the oil and mix with the water. When the fizzy tablet was added, it sank to the bottom, then started to dissolve. As it dissolved it made carbon dioxide, a gas. Gas (like air) is lighter than water, so it floated in bubbles to the top. The bubbles bring some colored water with them to the top. When the gas comes out of the bubble, the colored water sinks. This happens repeatedly until the tablet is completely dissolved.
- STEAM Learning Term of the Week:
  - Density: The mass of a unit volume of a material substance.
Ice Fishing

- **Age Group:** 5-10
- **Skill Level:** Beginner
- **STEAM:** Science
- **Adult Helper:** As needed
- **Learning Objective:** Students will learn how salt can cause physical change.

Have you ever wanted to go fishing from the comfort of your home? Have you ever wondered why when it snows, people spread salt on steps and roads? Today you will learn about the power of salt!

**Activity One** 30 minutes  **Lesson** 10 minutes  **Coaches Notes** 10 minutes

**Here is what you need:**
- Ice cubes
- Glass of water
- Salt
- Food coloring (optional)
- String or twine

**At the end of this module, students will be able to:**
- Understand how salt can cause a physical change.
**Activity: Ice Fishing**

**Here is what you do:**

Experiment One:
1. Add half a dozen ice cubes to a cup and fill with water.
2. Lay the string over an ice cube.
3. Gently pull the string. What happens?

Experiment Two:
1. Add half a dozen ice cubes to a cup and fill with water.
2. Lay the string over an ice cube.
3. Sprinkle salt over the string and ice. Wait 30-60 seconds.
4. Gently pull the string. What happens?

**Bonus 🌟**

Try experimenting with different strings, like fishing line versus twine. Which is better for “ice fishing”?

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**COACHES NOTES**

- **STEAM Question of the Week:**
  - Why do people use salt to melt ice? Salt lowers the freezing point of water. It can change the state of the water from solid (ice) to liquid. When you add salt to the ice cube, it melts a thin layer on the ice cube. The water then refreezes around the string, so you can pick it up. When people sprinkle salt on icy steps and roads to melt the ice, that's science at work, keeping us safe!

- **STEAM Learning Term of the Week:**
  - State of matter: One of the forms in which matter can exist. Four states of matter are observable in everyday life: solid, liquid, gas, and plasma. Water is the only common substance that is naturally found as a solid, liquid or gas.