



Endeavour Elementary PTSA STEM + Families Science Festival Parent/Caretaker Guide

This guide will help you lead your family through these Science Festival activities. You can give the printed student guides to your children to do alongside you (they're more like worksheets).

Program Goals

- Make real-world connections with STEM principles like problem-solving and critical thinking.
- Inspire your family to explore interests and even potential careers in STEM.
- Give your family access to STEM activities you can do at home.

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Frequently Asked Questions for Caretakers

What is included in this guide?

In this guide, you will find resources to use as you facilitate this event and the experiments for your family. Each experiment has a video you can watch, vocabulary to use, materials needed and instructions to follow. After you have conducted the experiment, you can have a family discussion, using the “expand your knowledge”, “real world application questions” and the grade level questions. The grade level questions are broken up into Kindergarten–second grade and third through fifth grade. For older students, these questions are still relevant! Just encourage them to dig deeper in the level of detail they give in their responses. We have provided suggested answers to all of the questions.

Finally, there is a Student Guide handout for your children to use to follow along. In the handout, you will find blank space for your children to write what they have learned and to answer the questions. If you misplace either guide, they are available to download on the Endeavour PTSA website.

How should I facilitate this event for my family?

This event is an opportunity for your family to engage in fun STEM experiments. It is a hands-on event, which has four different experiments (Endeavour PTSA has provided the core materials for two of the activities). The goal of the event is to have fun, offline. This is an opportunity to experiment and learn about STEM and increase awareness of STEM education and careers. The four experiments require materials that you, most likely, have at home.



Do I do all of the experiments at one time?

That is up to you. Each experiment can be done on its own, and each experiment should take about 15-20 min. You can decide, as a family, if you would like to do all of the experiments at one time or over multiple days. In addition, you can select which of the experiments you and your family would like to do. You do not have to do all four of them.

Each experiment has a video, do I watch the videos?

Each experiment has a video for you. The video can be used in a number of ways. It is an opportunity for you to learn how the experiment is conducted, you can show your family the video experiment before or after you try it, or you can watch the video instead of conducting the experiment.

Do I let my child conduct the experiments?

Each experiment is made for children and students to conduct. In the instructions, there are recommended roles for adults and students. However, you can decide if you want to do the whole experiment or let your child do the whole experiment.

How long will each experiment take?

Each experiment will take about 15 minutes to complete.

How do I share pictures/videos of my family participating?

While you are conducting the experiments, please take a few photos or videos. You have a couple of options for sharing these pictures/videos. You can email them Endeavour PTSA to share with our sponsors—if you choose this option, you must also send a signed media release form (included on the last page of this guide). This allows the PTSA to share these pictures/videos publicly and with National PTA. Or, you can post the pictures/videos on social media and tag Endeavour PTSA—in this case, you don't need to submit a signed media release form for Endeavour PTSA to be able to share them publicly and with National PTA.

How can I share other feedback?

You are asked to complete a participant survey at PTA.org/Survey to share your experience. This will help both your local PTA and National PTA improve this type of programming.

*** IMPORTANT SAFETY REMINDER ***

ALWAYS PRACTICE SCIENCE SAFELY! As caregivers and parents, you assume responsibility for safely conducting these activities. Always read through directions first, before starting activities. Please remember to use safety glasses and wear appropriate clothing when necessary.

What is STEM?

STEM = Science, Technology, Engineering and Mathematics.

- STEM careers in the United States are growing faster than other professions.
- The demand for qualified professionals is high, but the supply of workers to fill these positions is low—especially among women, minorities and students from low-income families.
- Not all STEM careers require a four-year degree; many well-paid careers are accessible with a two-year degree or certificate.



Activating Question

Question: What makes a rocket lift off?

Possible answer: A rocket can lift off from a launch pad only when it expels gas out of its engine. The rocket pushes on the gas, and the gas in turn pushes on the rocket. With rockets, the action is the expelling of gas out of the engine. The reaction is the movement of the rocket in the opposite direction.

Experiment: Alka Rockets	
Handout for students	
Experiment video: Alka Rockets https://bit.ly/3p1K68F	
<p>Vocabulary</p> <p>Chemical reaction: What happens when two substances combine to make something new.</p> <p>Phase change: When enough energy is added or taken away from an object that it moves from a solid, liquid, gas phase to another phase.</p> <p>Pressure: The amount of force applied on an object.</p>	<p>Directions</p> <p>Adult and student: After you're outside, put on your safety glasses.</p> <p>Student: Pour approximately ½ inch of water into the film canister. Make sure to fill the film canister half full with water and not more than that.</p> <p>Adult and student:</p> <ul style="list-style-type: none"> ● Break the effervescent antacid tablet in half. ● Put one half of the tablet into the film canister. ● Quickly put the lid on the canister, make sure the seal is tight. <p>Student: Shake the canister vigorously, turn it upside down and place it on a flat surface or on the ground (on its lid).</p>
<p>Materials</p> <ul style="list-style-type: none"> ● Empty film canister ● Glass of water ● Effervescent antacid tablet ● Safety glasses 	<p>Adult and student: Step back a few feet! Wait and watch the film canister rocket launch.</p>



Alka Rockets Family Discussion

How does this work?

Possible answer: Alka-Seltzer tablets are made up of citric acid and sodium bicarbonate that react to form carbon dioxide when dissolved in water. When Alka-Seltzer is added to the water in the film canister, carbon dioxide is released which builds pressure inside it. When the pressure builds high enough, it blows the canister apart from its lid. Thus, launching the rocket in the air.

How is this connected to the real world?

Possible answer: Actual rockets use the same concept. In an actual rocket engine, hot gas is produced by the burning of fuel. The gas is accelerated to the rear of the rocket. This produces a thrusting force, which makes the rocket "lift off."

Kindergarten through Second Grade Questions:

Can you describe what you saw happen?

Possible answer: When you added the effervescent tablet and shook the container, it exploded.

What do you think made the rocket?

Possible answer: Shaking it and adding the effervescent tablet.

Third through Fifth Grade Questions:

What made the canister fly off the lid?

Possible answer: The effervescent tablet and shaking it.

What was the solid, liquid and gas in the reaction?

Possible answer: solid- effervescent tablet, liquid- water, gas- explosion

What other reactions cause things to "fly off"?

Possible answer: pressure, bubbles, gas

Experiment: Sticky Icky	
Handout for students	
Experiment video: Stick Icky https://bit.ly/3qEdLoM	
<p>Vocabulary</p> <p>Polymer: A natural or synthetic (man-made) substance made from joining together many small molecules or units. 'Poly' means many and 'mer' means units.</p> <p>Solution: Two or more substances mixed evenly together</p>	<p>Directions</p> <p>Adult: In your plastic cup, mix one tablespoon of plain warm tap water with one tablespoon of white glue.</p> <p>Student: Stir well with a popsicle stick. Tell your partner which color to use for the next step.</p> <p>Adult: Add a few drops of food coloring to the glue and water mix.</p> <p>Student: Stir well with a popsicle stick, keep stirring during the next step.</p> <p>Adult: Slowly pour two teaspoons of the Borax solution into the glue and water mixture.</p> <p>Student: Keep stirring until there is no liquid left.</p>
<p>Materials</p> <ul style="list-style-type: none"> • White school glue • Food coloring (various colors) • Borax (found in the laundry aisle) (cont, on next page) • Two pitchers: One labeled “Borax Solution,” one labeled “Water Only” • Warm tap water • Plastic Tablespoons (some for water, some for glue) • Plastic Teaspoons (for Borax solution) • Six-ounce plastic cups (one for each student-adult pair) • Popsicle sticks (one for each student-adult pair) • Safety glasses 	

Sticky Icky Family Discussion

How does this work?

Possible answer: The glue and water mixture contain chains of molecules, called “polymers,” which move relatively freely as a liquid. When the Borax solution is added it crosslinks the polymer chains together, restricting their movement. It is this molecule in the Borax solution that causes the liquid to turn into slime.



How is this connected to the real world?

Possible answer: One characteristic of polymers is that—like Sticky Icky—they can easily take a variety of shapes. We see polymers all around us—in our plastic toothbrushes, cell phone cases, rubber-soled shoes and even synthetic fabrics made into clothes and sheets! Knowing about polymers is useful in many STEM jobs from understanding DNA to designing smartphones.

Kindergarten through Second Grade Questions:

What did you see happen to the glue and water as more things were added?

Possible answer: They started forming a solid.

Why do you think that happened?

Possible answer: The ingredients together, it changed into a different form. Some of the ingredients made it happen.

Did the sticky icky slime change as you stirred it?

Possible answer: Yes. It got tougher and turned into a solid.

Third through Fifth Grade Questions:

Why do you think we needed to add the Borax solution?

Possible answer: It's the activator. It makes the slime.

Is your sticky icky slime a solid? a liquid? Or a little of both?

Possible answer: It's a little bit of both.

What did you notice happened to the substance as you stirred it?

Possible answer: It got tougher and turned more solid.

Experiment: Martian Jelly	
Handout for students	
Experiment Video: Martian Jelly https://bit.ly/361RkIrl	
<p>Vocabulary</p> <p>Basic: A solution is basic if it has a low concentration of hydrogen ions, or a pH of greater than 7. Some examples of basic things are soap, bleach, ammonia, and toothpaste.</p> <p>Acidic: The opposite of basic is acidic—acidic solutions have a high concentration of hydrogen ions and a pH of less than 7. Some examples of acidic things are lemon juice, coffee, and soda.</p>	<p>Directions</p> <p>Student: Fill your plastic cup halfway full with warm water. Dissolve one spoonful of grape jelly in the cup and note the color.</p> <p>Adult: Add a pinch of baking soda and stir. Be careful! A fizzing reaction will occur, possibly causing it to overflow.</p> <p>Both: When the fizzing dies down, what do you notice?</p> <p>Adult: Slowly, add 2-3 spoonfuls of vinegar. Take care not to let any vinegar splash—it can sting your eyes!</p> <p>Student: Stir until the color of the grape jelly solution changes again.</p>
<p>Materials</p> <ul style="list-style-type: none"> ● 1 tablespoon grape jelly ● 1/8 teaspoon baking soda (not baking powder) ● 1 tablespoon vinegar ● 1/2 cup of warm water ● Popsicle stick to stir solution 	

Martian Jelly Family Discussion

How does this work?

Possible answers: Chemical reactions occur when one chemical comes into contact with another. For example, when you added the baking soda (a base), a reaction occurred and it made the solution basic, changing the color of the grape jelly to a greenish-black. When you added vinegar (an acid), a reaction occurred, and the color of the grape jelly solution changed back to purple.

How is this connected to the real world?

Possible answers: Neutral pH (not basic or acidic) is best for most living beings. The more acidic or basic a liquid becomes, the more irritating it is to our skin, eyes, and organs. For example, most household cleaners (bleach, oven cleaners and tub and tile cleaners) are basic. Many things we like to eat are acidic but can harm our stomach or damage our teeth in large quantities, like coffee or soda, or citrus juice. Knowing how to combine acids and bases is very helpful for baking and cooking and for scientists working with dangerous acids and bases.



Kindergarten through Second Grade Questions:

What did you see?

Possible answers: The jelly changed color, and was darker. It also broke apart and came back together.

Can you describe what happened when the jelly changed color?

Possible answers: It turned dark.

Did you hear or smell any changes?

Possible answers: I smelled a change in the liquid.

Third through Fifth Grade Questions:

Can you explain what happened when we added baking soda and when we added vinegar?

Possible answers: It changed the color and the consistency of the mixture in the glass.

Is the baking soda an acid or a base, why do you think that?

Possible answers: It's a base, because it does not change things a lot.

Is the vinegar an acid or a base, why do you think that?

Possible answers: It's an acid, because it adds bubbles.

Experiment: Bubbling Lava Lamp	
Handout for students	
Experiment Video: Bubbling Lava Lamp https://bit.ly/3qL87B9	
<p>Vocabulary Intermolecular polarity: Water molecules are attracted to other water molecules; oil molecules are attracted to other oil molecules. The structures of the two molecules do not allow them to bond together.</p> <p>Density: Describes how much space an object or substance takes up (its volume) in relation to the amount of matter in that object or substance (its mass). If an object is heavy and compact, it has a high density. If an object is light and takes up a lot of space, it has a low density.</p>	<p>Directions Adult: Help your student draw a line $\frac{1}{4}$ of the way from the bottom of the bottle.</p> <p>Student: Pour water into the bottle up to the $\frac{1}{4}$ line.</p> <p>Student: Pour vegetable oil until the bottle is nearly full. Leave at least 1 inch of space at the top.</p> <p>Student: Add about 10 drops of food coloring to the bottle. Choose whatever color you like or try mixing two colors!</p> <p>Adult or student: Break an effervescent antacid tablet into several pieces and drop one into the bottle. Close the cap tightly and flip the bottle over. When the bubbling stops flip it over and add another piece.</p>
<p>Materials</p> <ul style="list-style-type: none"> ● Water ● A clear plastic bottle with cap ● Vegetable oil ● Food coloring ● Effervescent antacid tablet 	

Bubbling Lava Lamp Family Discussion

How does this work?

Possible answers: Oil and water do not mix. The oil and water separate in the bottle, with oil on top because it has a lower density than water. The food coloring falls through the oil and mixes with the water at the bottom. The antacid “fizzy” tablet creates bubbles of carbon dioxide which is a gas and is less dense than both oil and water so it will move to the top and bring some of the colored water with it.

How is this connected to the real world?

Possible answers: When oil spills in the ocean, it floats on water, spreads out and forms a “slick.” This oil slick can coat and damage birds who dive for food, as well as destroy beaches and other homes for coastal animals. Understanding density and polarity is essential for people who help clean up oil spills and care for the animals.



Kindergarten through Second Grade Questions:

Why do you think that happened?

Possible answers: The oil stayed on top of the water because it does not mix with water.

Which direction did the bubble go?

Possible answers: They float up.

Third through Fifth Grade Questions:

What direction were the bubbles traveling?

Possible answers: They float up.

What happened when the 'fizzy' tablet was added?

Possible answers: It caused bubbles to come and float up.

What else did you see happening, can you explain what happened when the tablet was added?

Possible answers: It added bubbles to the water which reacted with the oil.

Extensions

Additional experiments

To keep the STEM excitement alive by doing more activities as a family, go to:

- PTA.org/STEM/At-Home
- MakingScienceMakeSense.com/Science-Library/Experiments/

Media Release Form: For the Stem+ Families Science Festival:

I grant to National PTA, Bayer Fund and their representatives and employees the right to take or use photographs and/or video of me and my family in connection with the PTSA program without further compensation and without the need for any further consent from me. I authorize the National PTA, Bayer fund and its assignees and transferees to use and publish the same in print and/or electronically. I agree that National PTA and Bayer Fund may use such photographs or videos of me and my family with or without my name for any lawful purpose, including for example such purposes as publicity, illustrations, advertising and web content. I have read and understand the above:

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Printed Name: _____