READY, SET, EXPERIMENT: STEAM ACTIVITIES

POWERED BY ARM & HAMMER™ BAKING SODA

Dear Educator,
Young Minds Inspired is pleased to team up with ARM & HAMMER™ Baking Soda to bring you this hands-on, STEAM-focused educational program designed to inspire young scientists while supporting core learning skills in an engaging way.

The program also reminds you to start planning for ARM & HAMMER™ Baking Soda Rocket Day on October 9, 2025, when students across the country will celebrate science by launching their own bottle rockets powered by ARM & HAMMER™ Baking Soda and vinegar.

Please **share** this teaching kit with other educators at your school. And **tell us** what you think of it by visiting **ymiclassroom.com/feedback-bakingsoda**. We look forward to receiving your comments.

Sincerely,
Dr. Dominic Kinsley
Editor in Chief
Young Minds Inspired

Questions? Contact YMI toll-free at 1-800-859-8005, or by email at **feedback@ymiclassroom.com**.

Target Audience
Grades 4-6

Program Components
Available at **ymiclassroom.com/bakingsoda**:
- This teacher's guide
- Instructions on how to create a baking soda rocket
- Two reproducible student activity sheets
- A reproducible family letter (in English and Spanish)
- A standards chart

Concepts and Skills
Math	Engineering design
Scientific method	Critical thinking
Data collection	Collaboration

How to Use This Guide
Photocopy the activity sheets to distribute to students and use the information below as a guide to implement them. To extend the learning fun to the home, we encourage you to share the reproducible family letter with parents and post it on your class website.

Start the Countdown to ARM & HAMMER™ Baking Soda Rocket Day!

On October 9, 2025, students across the country will build and launch baking soda rockets. But the day isn't just about launching rockets. It's about launching futures. ARM & HAMMER™ Baking Soda's mission is to inspire the next generation of scientists, engineers, artists, and innovators through the wonders of STEAM.

Join the fun by using the how-to handout in this kit and the video at **bakingsodarocket.com** to test baking soda rockets with your students. Invite families to join you!

As you conduct the experiment, have students make predictions and record data on the Activity 1 worksheet. Also, explain the science:
- When baking soda (a base) and vinegar (an acid) are mixed, they create a chemical reaction that produces carbon dioxide (CO_2). This is the same gas that makes soda fizzy and that we exhale with every breath!
- Inside the bottle, the carbon dioxide gas has nowhere to go. It pushes against the sides of the bottle creating pressure, and as the pressure builds, the cork pops, releasing the gas and launching the rocket.
- This is similar to what happens with real rockets, which also rely on a chemical reaction that produces gas. This gas builds up pressure inside the rocket engine and creates ***thrust***, which pushes the rocket upward.

Activity 1: Rocket Math
Students predict and measure various aspects of a baking soda rocket experiment.

MATERIALS: stopwatch, measuring tape

Before testing your baking soda rocket, distribute the activity sheet and review the instructions with students. In Part 1, students convert measurements to help them understand the ratio of baking soda and vinegar used to fuel their rocket. For Part 2, students work in small groups to make predictions about your class rocket. Then, at launch, students will use stopwatches to time the rocket's flight duration. After launch, they will use measuring tapes and landmarks to collect data on the distance the rocket travels.

Have students record the results on the sheet. Which group's prediction came closest?

Answers: **Part 1:** 1. 9 teaspoons; 2. 24 fluid ounces; 3. approximately 4.2 cups; 4. 3 tablespoons; 5. 3 cups; 6. 48 tablespoons. **Bonus:** 62 miles = 190,120 yards = 327,360 feet

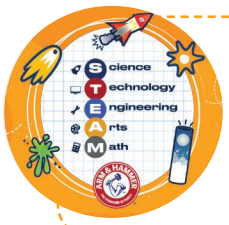
Activity 2: Your Message Awaits Liftoff
Students use science, creativity, and invisible ink to craft a hidden message.

MATERIALS: See activity sheet.

Distribute the activity sheet and review the directions together. Ask student volunteers what hopes and dreams or messages about life on Earth they would launch into space. Have students plan their messages and write them on white paper following the instructions on the activity sheet. Check out the video demonstration here: **armandhammer.com/for-everything-soda/invisible-ink**

Determine which method you will use to reveal the students' messages — a non-halogen light bulb, hair dryer, or grape juice. This requires adult supervision. Be sure that you handle all heat sources and keep them away from water. Do not place the paper too close to the heat.

As a follow-up discussion, ask students why they think the heat or grape juice makes the message appear. Explain that water mixed with baking soda creates a chemical reaction that slightly erodes the paper. Once heat or grape juice are applied, the eroded parts of the paper darken, revealing the message. The chemical reactions can be stated as follows:
- Heat: Sodium bicarbonate (baking soda) + heat → sodium carbonate + water + carbon dioxide (CO_2)
- Grape juice (an acid): Sodium bicarbonate (baking soda) + acid in juice → carbon dioxide (CO_2) + water + salt



Looking for additional baking soda activities? Check out the STEAM projects at **armandhammer.com/en/steam**.

Reproducible How-To Handout

HOW TO BUILD A BAKING SODA ROCKET

Get ready for some STEAM fun! Below are the instructions for building a baking soda rocket. You might do this as a class or share the instructions with families to do at home. **NOTE: Adult supervision, outdoor space, and safety goggles are required.**

THE SPACE GAL FEATURING! EMILY CALANDRELLI

Check out the video demonstration with astronaut Emily Calandrelli at **bakingsodarocket.com**.

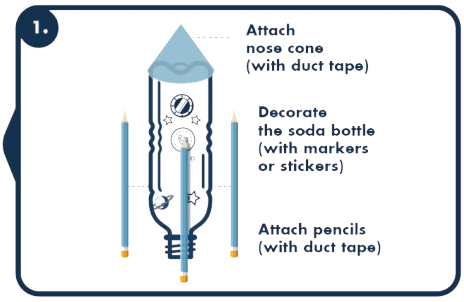
MATERIALS NEEDED:

- Empty 2-liter soda bottle
- Cardstock (for nose cone)
- 3 tablespoons ARM & HAMMER™ Baking Soda
- 3 cups vinegar
- Paper towel
- 3 pencils (for rocket feet)
- Duct tape
- Cork (must fit the mouth of the soda bottle)
- Markers, paint, stickers (to decorate your rocket)
- Safety goggles (wear at all times)

DIRECTIONS:

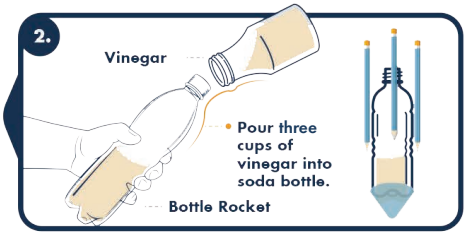
STEP 1: Build your rocket.

- Create a nose cone for your rocket with cardstock. Turn the empty soda bottle upside down and tape the cone to the bottom of the bottle using the duct tape.
- Create feet for your rocket on the opposite end of the bottle. Tape the 3 pencils along the sides of the bottle (evenly spaced) so that they extend beyond the bottle opening.
- Use markers, paint, or stickers to decorate your rocket.



STEP 2: Pour in the rocket propellant.

Pour 3 cups of vinegar into the soda bottle.

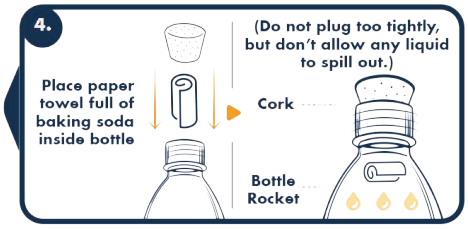


STEP 3: Prepare the rocket fuel.

- Put 3 tablespoons of ARM & HAMMER™ Baking Soda onto a small square of paper towel.
- Roll the paper towel tightly enough to fit through the bottle opening and so that no baking soda can spill out.

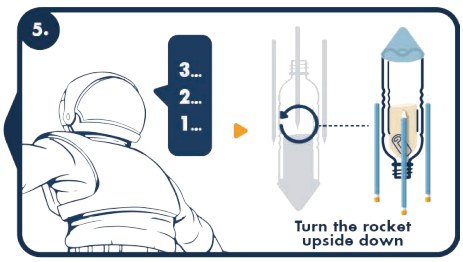
STEP 4: Get ready for launch!

- In your outdoor space, point the rocket away from all people.
- Place the rolled paper towel filled with baking soda inside the bottle.
- Quickly place the cork in the bottle. Do not plug the bottle too tightly, but do not allow any liquid to spill out.



STEP 5: LIFT OFF!

- Count down from 3 to 1.
- When you reach 1, flip the bottle onto its feet and STAND BACK for lift off!
- Be patient – it can take up to 6 minutes for your rocket to launch.



Activity 1

ROCKET MATH

Reproducible

PART 1: It takes math to prepare the materials for a baking soda rocket. To get started, fill in the blanks below with the correct conversions. Use the chart to help you.

1. 3 tablespoons = ____ teaspoons
2. 3 cups = ____ fluid ounces
3. 1 liter = ____ cups
4. 9 teaspoons = ____ tablespoons
5. 24 fluid ounces = ____ cups
6. 3 cups = ____ tablespoons

Unit	Equivalent
1 cup	8 fluid ounces (fl oz)
1 pint	2 cups
1 quart	2 pints
1 tablespoon (tbsp)	3 teaspoons (tsp)
16 tablespoons (tbsp)	1 cup
1 liter	33.8 fluid ounces (fl oz)
1 foot	12 inches
1 yard	3 feet
1 mile	5,280 feet

PART 2: Now you're ready to launch your rocket. Work with your group to fill in the table below with your predictions for how fast your rocket will lift off, how long it will fly, and how high and how far it will go. Write the predictions of two other groups in the table, too. After your launch, fill in the results under "actual." *Were your predictions close?*

	Group 1 (My group)		Group 2		Group 3	
	Prediction	Actual	Prediction	Actual	Prediction	Actual
How long will it take the rocket to launch?						
How long will the rocket stay airborne?						
How far will the rocket travel?						
How high will the rocket go? (Use a landmark reference like a tree or building for this answer.)						

BONUS: For a "real" rocket to leave the Earth's atmosphere, it needs to travel 62 miles above sea level. How many yards does the rocket travel before it is in space? How many feet?

_____ yards

_____ feet

Activity 2

Reproducible

YOUR MESSAGE AWAITS LIFTOFF

What if your biggest hopes and dreams could travel through time and space like a rocket, but remain hidden from sight until the universe reveals them? What would your message convey about life on Earth? With just a few ingredients and science know-how, you can create your very own invisible ink message to the stars!

ARM & HAMMER™ MESSAGE TO THE STARS

PART 1: Write a draft of your message below. It might be words or an image… or both!

PART 2: Now, follow the steps below to create your invisible ink message! Since this involves heat, a grown-up must help with revealing the message.

MATERIALS NEEDED:

- White paper
- Water
- ARM & HAMMER™ Baking Soda
- Paintbrush or cotton swab
- Cup
- Light bulb or hair dryer (heat source)
- Purple grape juice (optional)

DIRECTIONS:

1. Mix equal parts water and baking soda together in a cup or small container.
2. Use a cotton swab or paintbrush to write a message (or draw a picture) on the paper, using the baking soda solution as "ink."
3. Allow the ink to dry. The paper will look blank, but you know there's a message on it!
4. Reveal the message by having a grown-up hold the paper up to a heat source, such as an incandescent light bulb or a hair dryer. The heat should turn the baking soda in the lettering brown, so you can read it.
5. Alternatively, you can paint over your message lightly with purple grape juice to make it visible!

DEAR PARENTS & CAREGIVERS,

Ready, Set, Experiment! In school, your child has been participating in an interactive STEAM program from ARM & HAMMER™ Baking Soda and Young Minds Inspired that brings science concepts to life in a fun way, while sparking curiosity and critical thinking. Students conduct exciting experiments with baking soda — like launching rockets and writing with invisible ink — while asking questions, testing ideas, and exploring science like real investigators.

CONDUCT YOUR OWN SCIENCE EXPERIMENTS

Baking soda isn't just for baking – it's a STEAM superstar! From volcanoes to rockets, it makes science fun and hands-on. With your child, visit **armandhammer.com/en/steam** to discover activities that you can do together to experiment, learn, and keep the curiosity going. Try this far-out idea for craft time to get started!

ARM & HAMMER™ BAKING SODA ROCKET DAY

On October 9, 2025, students across the country will build and launch baking soda rockets. But the day isn't just about launching rockets. It's about launching futures. ARM & HAMMER™ Baking Soda's mission is to inspire the next generation of scientists, engineers, artists, and innovators through the wonders of STEAM. Come along for the ride! Ask your child's teacher about joining the class for this event. Or visit **bakingsodarocket.com** for the directions to build a baking soda rocket at home with your child and watch the rockets and creativity soar!

ALIEN SLIME

WHAT YOU NEED:

- 5 small bowls
- Clear liquid glue
- 2 ½ teaspoons ARM & HAMMER™ Baking Soda
- 5 colors of food coloring
- Saline solution

WHAT TO DO:

1. Start with 5 small bowls. Pour 4 oz. of clear liquid glue into each.
2. Add ¼ – ½ tsp. of baking soda to each bowl; mix well.
3. Add 3-5 drops of food coloring into each bowl and stir.
4. Gradually add 10-15 drops of saline solution. (HINT: Avoid adding too much at once: the slime can become brittle.)
5. When the slime reaches a gooey state, remove it from the bowl and knead with your hands.
6. If it still feels sticky after 1-2 minutes, add a couple more drops of the saline solution.
7. When all 5 batches are ready, twist the slime together to create your tie dye pattern.