

Thank you for downloading the science and mathematics activity packet! Below you will find a list of contents with a brief description of each of the items. This activity packet contains all the information (including any handouts) you will need to run this activity in your own classroom or at a science festival.

Please note: some activities might require the need for a facilitator to be present to oversee the activity. Activities that require a facilitator will be clearly noted.

-Community Resources for Science



ACTIVITY PACKET CONTENTS

1. Organizer instructions for the person running the activity
 - Print suggestion: 1 for the facilitator or organizer
 - Includes information for setup prior to the event (e.g., materials prep)
2. Background Information for organizer/facilitator
 - Print suggestion: 1 for the facilitator
 - This provides additional information for the organizer or activity facilitator regarding the science behind the activity
3. What's Going On? (tabletop sign/printout)
 - Print suggestion: 1 to put in a plastic sign holder
 - Explains the science and background information behind the activity
4. Participant Instructions (tabletop sign/printout)
 - Print suggestion: 1-2 to put in a plastic sign holder(s)
5. Take home sheet for participants
 - Print suggestion: number of expected participants (most packets are formatted as 2 half-sheet handouts)
 - Easy-to-follow instructions for participants to try the activity at their homes



ORGANIZER INSTRUCTIONS

Grades: K-5

Standard Connections:

NGSS

Asking Questions: Ask questions based on observations to find more information about the natural and/or designed world(s).

Objective: Students will make “ExploraGoo” and explore its properties by experimenting with it

Activity Overview and Background: Borax and glue combine to make elastic polymers called elastomers, which gives ExploraGoo its unique properties

This activity requires the presence of a facilitator to assist participants

Estimated cost for one set activity supplies: \$5.50-7.25, plus \$0.75 each 4 oz glue

Materials:

- Newspaper
- Plastic wrap or waxed paper
- 4-ounce bottles of white glue (\$0.75/4 oz bottle)
- Two large plastic containers or glass bowls
- Measuring cups
- Water
- Food coloring (\$2.75/ 4 bottles/pkg)
- Measuring spoons (teaspoon)
- Boraxo powdered hand soap or a box of borax (in the laundry aisle of most supermarkets) (\$2.75/12 oz. Boraxo; \$4.50/76 oz. box)
- Cookie cutters (optional)
- Small plastic containers with a lid (e.g., cream cheese tubs), or plastic sandwich bags

Set up:

1. Put some newspaper on the table or counter, then cover the newspaper with plastic wrap
 - Note: ExploraGoo sticks to paper
2. Set out materials to make Exploragoo with sets of instructions and background documents
3. Students can take home his or her Exploragoo in the small plastic containers or plastic sandwich bags



BACKGROUND INFORMATION

What is Borax?

Borax is a white crystal that is used in laundry soap, paint, pottery glazes, leather tanning, and in medicine. Most of the world's Borax is mined in California – in Death Valley and the Mojave Desert—and in Tibet.

Don't let your child eat the ExploraGoo!

The ingredients in ExploraGoo aren't poisonous, but they aren't food products either. Kids who eat paste and Play-doh may be tempted to eat their ExploraGoo. Don't let them. We haven't experimented to learn what will happen to a child who eats ExploraGoo, and we'd rather you didn't, either.

What is this ExploraGoo?

When you mixed up your ExploraGoo, you started a chemical reaction. The glue molecules and the borax molecules reacted with each other and combined to make a tangled structure of long, flexible, cross-linked chains. This structure—a giant molecule made up of thousands of smaller molecules—is called a *polymer*. Nylon and plastic are both polymers, much like your ExploraGoo.

Make a blob of ExploraGoo into a ball and try bouncing it. ExploraGoo (like rubber balls, car tires, and rubber bands) is bouncy because it's *elastic*. That means the ExploraGoo changes shape under pressure, but then returns to its original form. Elasticity is what give a ball its bounces—the ball flattens out when it hits the ground, then springs back to its original shape. When the ball returns to its original shape, it pushes off the ground and bounces back.

The long, tangled polymers that make up ExploraGoo (and rubber and many plastics) are called *elastomers*. Elastomers are what make these compounds so bouncy. When a blob made up of tangled polymers is put under pressure, the tangles straighten out temporarily. When the pressure is released, the molecules return to their tangles—and the blob bounces back.



What's Going On?

When you mixed up your all the ingredients, you started a chemical reaction. The glue molecules and the borax molecules reacted with each other and combined to make a tangled structure of long, flexible, cross-linked chains. This structure (a giant molecule made up of thousands of smaller molecules) is called a *polymer*. Nylon and plastic are also both polymers.

Try This!

Make a blob of ExploraGoo into a ball and try bouncing it. ExploraGoo (like rubber balls) is bouncy because it's *elastic*. That means the ExploraGoo changes shape under pressure, but then returns to its original form. Elasticity is what gives a ball its bounces—the ball flattens out when it hits the ground, then springs back to its original shape. When the ball returns to its original shape, it pushes off the ground and bounces back up.

The long, tangled polymers that make up ExploraGoo (and rubber and many plastics) are called *elastomers*. Elastomers are what make these compounds so bouncy. When a blob made up of tangled polymers is put under pressure, the tangles straighten out temporarily. When the pressure is released, the molecules return to their tangles—and the blob bounces back.

Instructions

1. Pour the bottle of glue into one bowl
2. Add $\frac{1}{2}$ cup of water and some food coloring
 - A fun color is 10 drops of yellow and 5 drops of green
3. Mix everything together
4. In the other bowl, put 2 teaspoons of Boraxo powdered soap (or 1 teaspoon of borax powder)
5. Add $\frac{1}{2}$ cup of water and stir until the borax is dissolved
 - You may still see a few specks of the soap—that's ok!
6. Pour the colored glue-water mixture slowly into the borax-water mixture
 - A big glob of ExploraGoo will form before your eyes!
7. Reach into the bowl with both hands and pick up the glob
8. ExploraGoo will be very, very, very slippery!
9. Pick up as much ExploraGoo as you can
 - There will be a little water and some pieces of goo left in the bottom of the bowl—that's ok
10. Store your ExploraGoo in a plastic container or sandwich bag

Have fun playing with ExploraGoo, **BUT DON'T EAT IT!**

What to do with ExploraGoo?

1. ExploraGoo will get less slippery the more you play with it
 - Don't put ExploraGoo on paper, carpet, furniture, or clothes—It's really sticky!
2. Can you stretch your ExploraGoo?
 - It looks solid, but can you “pour” it from one hand to the other?
3. If you pull the ExploraGoo apart quickly, what happens?
4. Can you pull off a piece and bounce it?
5. If you press ExploraGoo into a small container, does it make rude noises?
6. Add a drop of food color to your ExploraGoo after you've played with it for a while to make cool swirls of color!

How to Keep Your ExploraGoo Fresh

Store your ExploraGoo in a plastic container with a lid. When you take the ExploraGoo out, it will be the shape of the container. As you play with it, it will start to “melt” and look like a blob again. ExploraGoo will last for about one month or so. When it starts to ooze water, it's time to throw it away and make some more!

ExploreaGoo

What you'll need:

- 4 oz. bottle white glue
- Water
- Food coloring
- 2 plastic bowls
- Measuring cups
- Measuring spoons
- 1 tsp Borax powder OR 2 tsp Boraxo powdered soap

Instructions:

1. Pour the bottle of glue into one bowl
2. Add $\frac{1}{2}$ cup of water and some food coloring and mix everything together
 - A fun color is 10 drops of yellow and 5 drops of green
3. In the other bowl, put 1 teaspoon of borax powder (or 2 teaspoons of Boraxo powdered soap)
4. Add $\frac{1}{2}$ cup of water and stir until the borax is dissolved (a few soap specks is ok!)
5. Pour the colored glue-water mixture slowly into the borax-water mixture
 - A big glob of ExploraGoo will form before your eyes!
6. Reach into the bowl with both hands and pick up the glob... ExploraGoo will be very, very, very slippery!
7. Pick up as much ExploraGoo as you can and play around with it
 - There will be a little water and pieces of goo left in the the bowl—that's ok

Have fun playing with the ExploraGoo, BUT DON'T EAT IT!

ExploraGoo

What you'll need:

- 4 oz. bottle white glue
- Water
- Food coloring
- 2 plastic bowls
- Measuring cups
- Measuring spoons
- 1 tsp Borax powder OR 2 tsp Boraxo powdered soap

Instructions:

1. Pour the bottle of glue into one bowl
2. Add $\frac{1}{2}$ cup of water and some food coloring and mix everything together
 - A fun color is 10 drops of yellow and 5 drops of green
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