



Project Exploration creates transformative learning opportunities for youth underrepresented in the sciences –particularly students of color and girls – by equipping them with the skills, practices, and mindset needed for a lifelong pursuit of learning. STEM@Home makes activities around science, technology, engineering, and math accessible and fun to do at home. This STEMbook activity, resources, and more are available at www.projectexploration.org/stemathome.

In this activity, you will:

learn about erosion - how water can break rocks down into pebbles and sand!



Supplies Required:

Graphic organizer
1 cup water
Water Balloon
Disposable cup
Popsicle stick (for mixing)

1 cup of plaster
Thumb tack
Pencil
Twist tie
Duct tape

Video

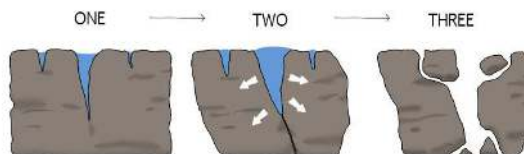
Watch the video instructions for how you'll do the experiment: <https://tinyurl.com/y2pb6j72>

Overview

Rocks come in all different shapes and sizes. You may not believe it, but sand is also rocks that have been broken down to little pieces, but what in the world can break a rock? Believe it or not it's WATER! The process of rain or snow falling on rocks and wearing away at them over time is called **erosion**. Erosion also describes the process of water from streams, rivers, and oceans washing over rocks and shorelines to break down rocks into cliffs and sand. This process of erosion that forms beaches and river beds occurs over thousands of years to create the places we love to visit today.

Another way water breaks down rocks is by freezing! When rain and moisture falls on mountain peaks, or when snow melts from the sun during the day, the water settles into cracks and crevices in the rocks. Overnight, temperatures drop and the water in those cracks freezes. As water freezes, it expands and slowly increases the size of the cracks and crevices. Day after day, the process repeats; water melts and settles deeper in the cracks, then freezes and expands over night to widen the cracks until the rocks break apart continuously reshaping the peaks. This process is called **freeze thaw weathering**.

In our daily lives, we can see how water expands as it freezes by placing a water bottle in the freezer. Once frozen, you can take it out and see how it has expanded the plastic bottle. If you try it, be careful! A carbonated beverage like soda in a bottle or can and the high pressure contents will also expand and burst open the can if you let it freeze, making a mess of your freezer!



Instructions

1. **Problem** - How are mountain peaks formed? What process breaks rocks into pebbles and sand?
2. **Hypothesis** - Make a prediction! Can we replicate the freeze thaw weathering process using plaster and water contained within a water balloon? Will the plaster crack if the water freezes? How will it crack? Draw your prediction and share what you think will happen using the sentence starter, "I predict that..."
3. **Experiment** - Test it out and make observations!
 - Fill your water balloon *halfway* with water and tie it. Poke a twist tie into the balloon end and twist it so it lets you dangle the balloon from the twist tie.
 - Poke a hole in the bottom of your cup using a push pin. Make the same hole bigger with your pencil. Thread your balloon knot from the inside of the cup to the outside using the twist tie. Tape the balloon in place, making it leak proof.
 - Pour your plaster into a second cup and slowly add water, mixing thoroughly with your posicle stick each time until the plaster is fully mixed and ready to be set. You don't want it to be too watery! Just enough water to make a smooth yet slightly thick paste.
 - Once mixed, pour the plaster into your cup with your balloon until the balloon is fully covered. Place the cup inside the freezer.
 - Once the plaster is solid, remove the cup from the freezer. Remove your tape and remove the hardened plaster from the cup. Try to be gentle to wiggle it out without breaking it with your hands. Ask an adult for help, if you need scissors to remove the plaster and balloon from the cup.
 - What happened to the plaster? Is it solid or are there cracks? If there are cracks, what seems to have caused the cracks?
4. **Analysis** - Based on your observations what do we now know? What happened to the plaster around the balloon of water?
5. **Conclusion** - Was your hypothesis correct or incorrect? Share what you learned using, "my hypothesis was (in)correct because..."

Additional Resources

Think About It! Freeze thaw weathering is just one type of erosion. What other types of erosion can you imagine happens in the world? What about in your neighborhood and Chicago as a whole? Here are some additional resources to learn more about erosion, including the work of engineers in Chicago to prevent erosion along Chicago's lakefront.

1. Learn more about freeze thaw weathering and erosion of rocks: <https://tinyurl.com/zghk9r4>
2. Learn about other types of weathering: <https://tinyurl.com/y2b44zhg>
3. See how storms and erosion destroyed two beaches in Chicago this year: <https://tinyurl.com/y2ygcklw>
4. Engineers in Chicago try to prevent erosion of Chicago's lakefront parks and beaches: <https://tinyurl.com/y9yb4pht>

Share It Out

Share on social media: Take a photo of your plaster, including any cracks. Can you see your balloon? Share on social media with an explanation of what happened as the water froze.

#Weathering
#Erosion
#ProjectExploration
#STEMatHome

For more activities like this one, go to www.projectexploration.org/stemhome. If you're interested in learning more about Project Exploration and our free events, programs, and activities, please find us on social media and be sure to follow!



Call or text us for help: 312-772-6634

www.projectexploration.org