

Holiday STEMkit Supply List

Exploding Snowman

	Supplies
Sandwich bag	1
Permanent marker	1
Baking soda	3 tsp
Paper towel or tissue paper	1
Vinegar	2 cup (16 oz)

Salt Crystal Snowflakes

	Supplies
Glass Jar of Salt	1
Light blue pipe cleaners	3
Blue pipe cleaners	3
White pipe cleaners	3
Clothes pin	1

Holiday Coding Ornament

	Supplies
White, Green, and Blue Pony Beads	~30
Green Pipe Cleaners	1
Red Pipe Cleaners	1
Binary Code Worksheet	1

Holiday Light Circuits

	Supplies
Brass fastener	8
Tin foil	2 sheets
Scotch tape roll	1
Holiday lights	4
9 Volt battery	2
File Folder	1
Scissors	1

Math Talk Activity

	Supplies
Markers and Colored Pencil set	1
Shape cards	2 sets

**Happy Holidays from
Project Exploration!**





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 acid-base reactions when you build this Frosty!



Supplies Required:

- Sandwich-sized ziploc bag
- Permanent markers
- Baking soda
- Vinegar
- Paper towel

Video

What are acids and bases? <https://tinyurl.com/y49xkn79>

Overview

What happens when you mix baking soda with vinegar? A chemical reaction! A chemical reaction is when two substances are combined to form a completely new substance. Our two substances are vinegar and baking soda. When vinegar, an acid, and baking soda, a base, are combined they create tiny fizzy bubbles. These bubbles didn't exist before—they are a completely new! The bubbles contain carbon dioxide gas. This is the same gas that is released every time you exhale, or breathe out. Since the Ziploc bag is sealed, the gas has nowhere to go, and that's why the bag expands!



Instructions

1. Assign one color to 1s and another color to 0s. Make sure these stay separate!
2. Using the Binary Code Key, string beads onto the pipe cleaner according to the code.
3. Try: SNOW, TREE, CANDLE, GIFT, and WINTER. You may need more than one pipe cleaner, which is fine! If you need more, just twist them together.
4. Shape your codes into a fun design and hang them around your house to decorate!

Additional Resources

1. Read more about binary code here: <https://tinyurl.com/hkec44x>
2. Learn how to code for free here: <https://code.org>
3. What is computer coding? <https://tinyurl.com/qdfifg4>

Share It Out

Share on social media: Take a photo of your coded creations and share on social media with family and friends! Use the hashtags:

#CodingOrnament
#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 complete our interest form and a staff member will be in touch with you: www.projectexploration.org/interest.



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

www.projectexploration.org



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 the basics of binary code while creating an ornament!



Supplies Required:

Pony beads, two colors
Pipe cleaner
[Binary Code Key](#)

Video

How does binary code work? <https://tinyurl.com/ssgscty>

Overview

Binary code is how computers talk and represent information. Letters, numbers, and pictures, and everything else you see on the computer, is made up of different combinations of 0's and 1's. Computers transport, calculate, and translate binary numbers because computer hardware circuits only have two electrical states, on or off. These two states can be represented as 0 (off) or 1 (on). All letters of the alphabet, numbers, and symbols are converted to eight character binary numbers as you work with them in software on your computer. The combination of 0s and 1s make different things appear on a computer screen. For example, a picture of a snowman will have a different sequence of binary code than a picture of a cup of hot chocolate. Let's try it!



Instructions

1. Assign one color to 1s and another color to 0s. Make sure these stay separate!
2. Using the Binary Code Key, string beads onto the pipe cleaner according to the code.
3. Try: SNOW, TREE, CANDLE, GIFT, and WINTER. You may need more than one pipe cleaner, which is fine! If you need more, just twist them together.
4. Shape your codes into a fun design and hang them around your house to decorate!

Additional Resources

1. Read more about binary code here: <https://tinyurl.com/hkec44x>
2. Learn how to code for free here: <https://code.org>
3. What is computer coding? <https://tinyurl.com/qdfifg4>

Share It Out

Share on social media: Take a photo of your coded creations and share on social media with family and friends! Use the hashtags:

#CodingOrnament
#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 complete our interest form and a staff member will be in touch with you: www.projectexploration.org/interest.



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

www.projectexploration.org



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:

make snowflake decorations through evaporation!



Supplies Required:

- 2-3 cups of salt
- Mason jar or large cup
- Pipe cleaners
- Clothes pin

Video

What is the water cycle? <https://tinyurl.com/mv3c8t5>

Overview

A very important step in the water cycle is evaporation. This is the step that prevents our planet from being flooded and creates moisture in the air. Evaporation is a process where liquids change to a gas or vapor. Water changes to a vapor or steam from the energy created when molecules bounce into one another because they're heated up. If water has salt in it, like when you sweat or the ocean, when the water evaporates, it leaves behind the salt. This is why your skin tastes salty after a workout, or after you swim in the sea. The same process happens in this experiment! When the jar of saltwater is placed in a sunny spot, the sun warms up the water, causing it to evaporate. This leaves behind the salt on the pipe cleaner, and creates your snowflake!



Instructions

1. If you are completing this experiment with materials provided to you in your STEMkit, start by grabbing an extra bowl or cup you have at home and dump the salt in the mason jar into your extra container. Set it aside.
2. Use your now empty mason jar to collect and dump about 3 jars-worth of water into a pot. With adult supervision, turn the stove on high to bring the water to a boil.
3. Once the water boils, pour in the salt that you set aside. Allow the water to boil until crystals start to form on the surface of the water. If it boils for several minutes and no crystals form, add more salt.
4. Take the pot off the stove. While the water is cooling, design your snowflake using the pipe cleaners. Make sure the snowflake can fit easily through the mouth of each jar.
5. When the snowflake is designed, attach a pipe cleaner hanger to the top of your snowflake so you can suspend it in the mason jar.
6. Suspend the snowflake in the saltwater using a clothespin to hold them in place. Let the snowflake sit in a sunny window for 2-3 days.
7. After 2-3 days, remove your snowflake and let them dry. Your salt crystal snowflake is ready!

Additional Resources

Think About It! What do you think will happen to the salt water overnight? Why do you think we placed the jars near a sunny window?

1. Try another experiment evaporating water from salt: <https://tinyurl.com/y6e34srm>
2. How does water evaporate? <https://tinyurl.com/yy282bb5>
3. Why do we sweat? <https://tinyurl.com/y92uqwf9>

Share It Out

Share on social media: Take before and after photos of your experiment. Explain to your family and friends how the snowflakes were created by evaporation. Use the hashtags:

#SaltSnowflakes
#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 complete our interest form and a staff member will be in touch with you: www.projectexploration.org/interest.



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

www.projectexploration.org



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 how electricity travels through a circuit.



Supplies Required:

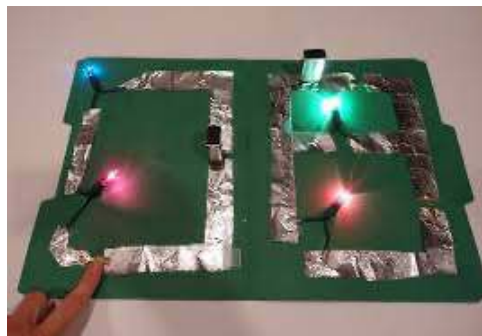
- File folder
- Tape
- Aluminum foil
- Brass fasteners
- Scissors
- 9 volt battery
- String of holiday lights

Video

Learn about circuits: <https://tinyurl.com/y5uo7vdq>

Overview

Electric circuits are paths for transmitting electric current, or moving electricity. Such circuits allow electricity to be used to provide power to lights, appliances, and many other devices. Wires made of metal and covered in plastic carry the electricity around a circuit. Metal is a good conductor of electricity, which means it can pass along the wire easily and well. The plastic around the wire insulates the electricity. The electricity is very powerful, and the plastic keeps it contained so that it does not harm people or other objects. Electric circuits can be set up in two ways. They can be either a series circuit or a parallel circuit. In a series circuit, all parts of the circuit are connected one after another to form a loop. Let's make one!



Instructions

1. To prepare the lights, you will need to cut the string apart and score the bottom of each light (about 3 cm) with scissors – just enough to remove the plastic coating.
2. Cut the aluminum foil into strips to serve as the “wires”.
3. Place your lights on to the file folder and then connect them using your strips of foil, leaving two gaps, one for the switch using brass fasteners and one for the battery. Stick the foil down with tape, ensuring that it touches the exposed wires of the lights.
4. You can set your circuit up any which way you like, as long as it connects to the battery and switches. Use the image below as an example:



Additional Resources

Think About It! What happens with you lift the brass fasteners? Find a piece of rubber--and eraser or a rubber band--and place it on the foil. What happens?

1. Explore this interactive about circuits: <https://tinyurl.com/wm43k7u>
2. What are different types of electrical circuits? <https://tinyurl.com/y715dpqv>

Share It Out

Share on social media: Take a photo of your circuit and explain how circuits work! Share on social media and use the hashtags:

#HolidayCircuit
#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 complete our interest form and a staff member will be in touch with you: www.projectexploration.org/interest.



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


project
exploration
changing the face
of science

www.projectexploration.org