



# STEAM CHALLENGES

Science - Technology - Engineering - Art - Agriculture - Mathematics

Livingston, McLean, & Woodford County  
STEAM In The Classroom



**Illinois Extension**  
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN



# STEAM CHALLENGES

## WHAT is STEAM?

STEAM stands for Science, Technology, Engineering, Art/Agriculture, and Mathematics.

## WHAT is a STEAM Challenge?

A STEAM Challenge is a challenge or activity to promote learning in the fields of Science, Technology, Engineering, Art/Agriculture, and Mathematics. Challenges/activities range from art projects and crafts to learning how to code or test your soil!

## WHO can do STEAM Challenges?

STEAM Challenges are for all ages! Whether you are 6 or 60, STEAM Challenges can be fun for everyone!

### **COLLEGE OF AGRICULTURAL, CONSUMER & ENVIRONMENTAL SCIENCES**

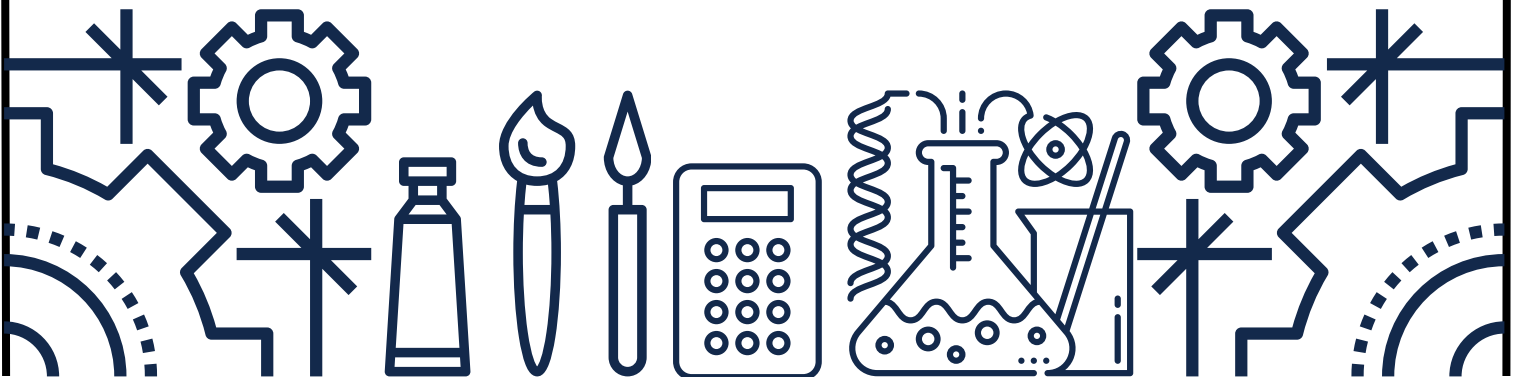
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**Everyday Steam Activities:  
Challenge Young Minds to Create, Innovate, and Explore!**

**Below are STEAM activity topics that relate to:**

- **Science**
- **Technology**
- **Engineering**
- **Design**
- **Art**
- **Crafting**
- **Research**
- **Problem Solving**
- **Creating**
- **Weather**
- **Earth**
- **Environment**

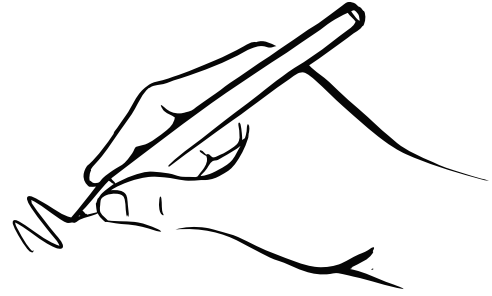


# IMAGINE, SKETCH, ENGINEER!

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

**For this challenge/activity you will need:**

- Paper
- Pencil/pen
- Household/recycled items
- Adhesive or connectors

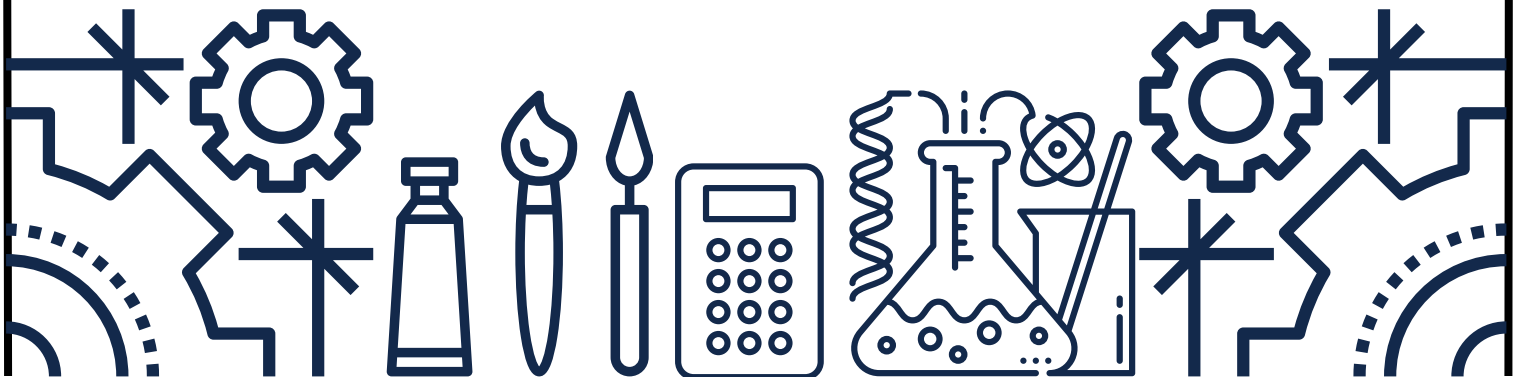


## **Introduction:**

Did you know that architects and engineers need to do a lot of planning before their ideas come to life? Often, they spend many hours designing big ideas or solutions to problems on paper or in computer software before what they have imagined can be built.

For this challenge, you will design anything you can imagine and then build it. Will you make a tall building for people to live in, a flying machine to transport food to hurricane victims, or a garbage truck that automatically sorts recycled items? Dream big!

**Directions:** Imagine a big idea or brainstorm a solution to a problem. Sketch your design on paper or the computer. Build your idea or solution with things you find around the house and items that can be recycled. Be sure your created object matches your sketch!

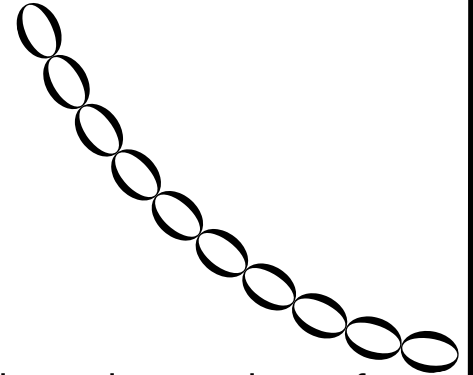


# PAPER CHAIN

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this challenge/activity you will need:

- 1 piece of paper
- Tape/glue
- Scissors



## Introduction:

Do you think you can make the longest paper chain using only one piece of paper? Give it a try with this challenge!

## Directions:

- Using only 1 piece of 8.5 in. by 11 in. paper (it can be any color you want), you will try to make a paper chain as long as possible.
- Start by coming up with a plan (what size strips you want to make, how many, etc.).
- Cut your paper into strips however you would like and start connecting them.
- Keep going until you use your whole piece of paper then measure your chain and see how long it got!

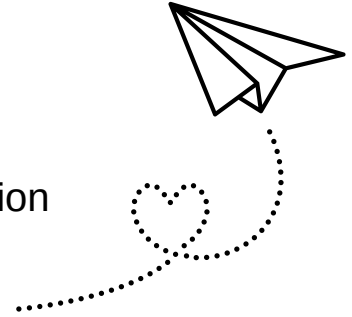


# RING WING GLIDER

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this challenge/activity you will need:

- Plain piece of paper.
- Transparent tape (optional)
- Ruler or tape measurer
- Additional types and sizes of paper for experimentation

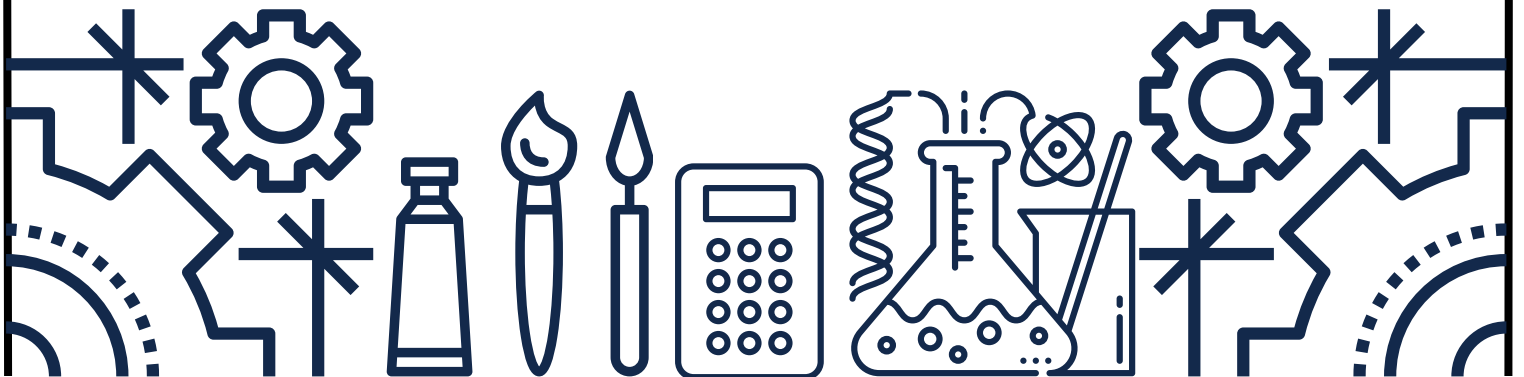


## Introduction:

For the month of February, we will explore contributions to STEM by historical African-American figures in honor of Black History Month. Before participating in this week's challenge, learn more about Bessie Coleman and how she became the first black woman to become a pilot.

After learning about Coleman, try to make your own Ring Wing Glider by following the instructions on the next page. What did you notice about the flight of your aircraft? Does it repeat the pattern each time you fly it? Make one change to your aircraft to enable a change in its flight, then fly your aircraft several times. How did the flight characteristics change with your wing change?

Activity Adapted From: <https://www.jpl.nasa.gov/edu/teach/activity/ring-wing-glider/>  
for educational use only



# RING WING GLIDER (CONT.)

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## Directions:

- Fold a piece of 8.5- x 11-inch paper diagonally as shown in diagram 1.
- Make a 1/2-inch fold along the previously folded edge as shown in diagram 2.
- Make a second 1/2-inch fold as shown in diagram 3.
- Curl the ends of the paper to make a ring and tuck one end into the fold of the other as shown in diagram 4.
- Gently grasp the “V” between the two “crown points” with your thumb and index finger.
- Toss the glider lightly forward. Note: The folds in the paper make the airplane’s front end heavy and the back end light. Curling the ends to make a ring changes the shape of the wing and improves the wing’s flight performance.

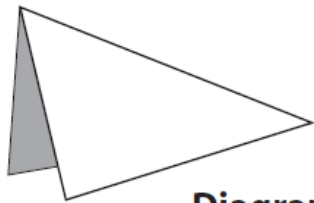


Diagram 1

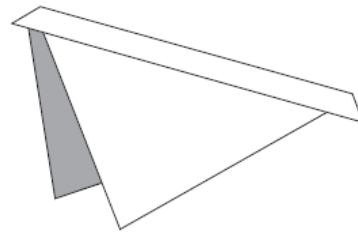


Diagram 2

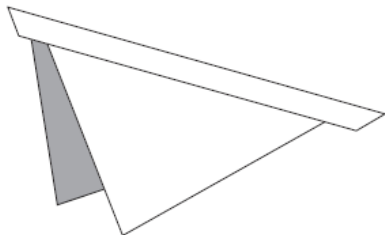


Diagram 3

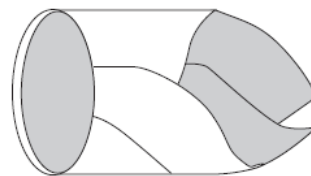


Diagram 4

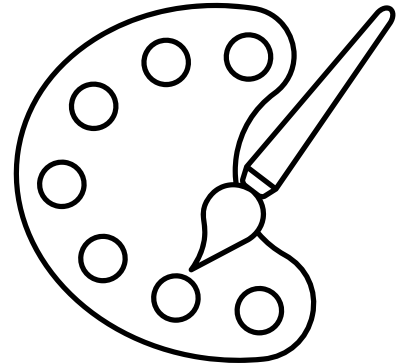


# FIZZY PAINTING

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

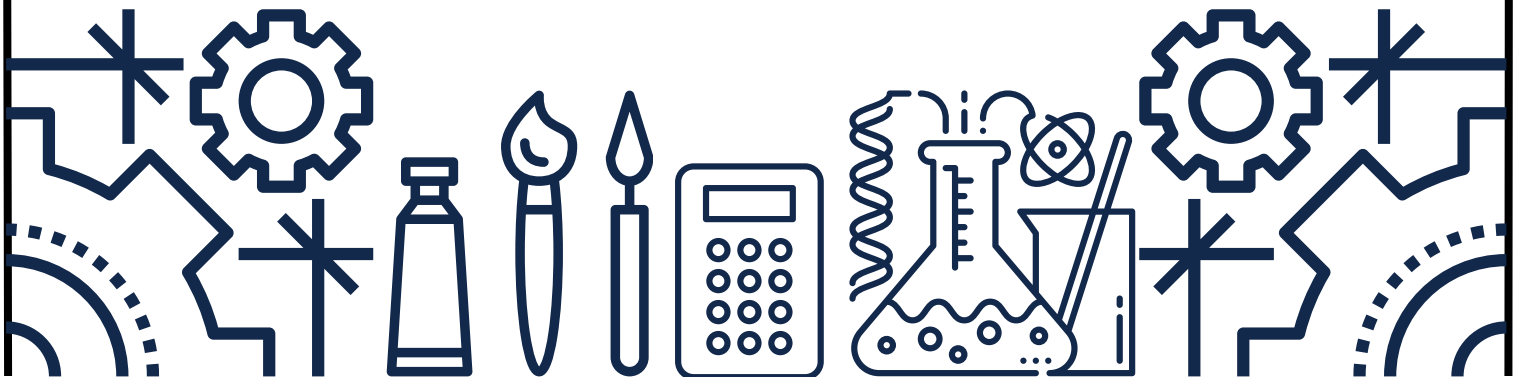
## For this challenge/activity you will need:

- Watercolor paper
- Food coloring
- Baking soda
- Vinegar
- Pipettes or droppers



## Directions:

- Start by sprinkling the baking soda onto your watercolor paper.
- Next, mix a few drops of food coloring with a tablespoon of vinegar in a cup or bowl.
- Use the pipettes to drop the colored vinegar onto the baking soda and watch it fizz where the drop lands.
- Repeat with different colors all over your paper in any pattern you want!
- Let dry.
- Scrape off the leftover baking soda once the paper has absorbed all of the colored vinegar and marvel at your masterpiece!



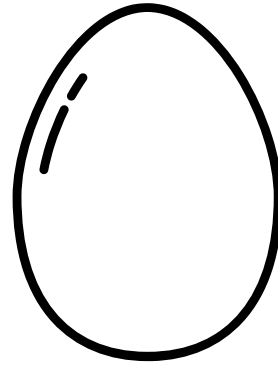


# BREATHING INSIDE THE EGG

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

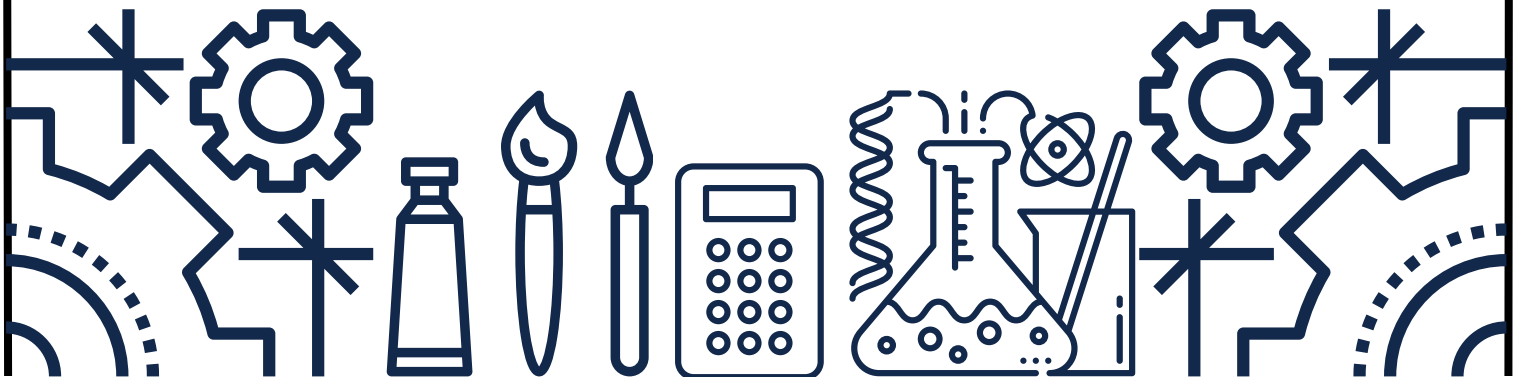
## For this activity you will need:

- Large bowl or pot
- Water
- Blue food color
- Liquid dishwasher detergent
- Teaspoon
- 3 eggs
- Tongs or large spoon
- Cup
- Plate or paper towel



## Introduction:

How does an unborn chick breathe inside its shell? To live, the chick must get air somehow! Directly inside the shell, there are two membranes to protect the embryo. Between the two membranes is a small air cell that's filled with oxygen. This is what the developing chick uses to breathe! But how does the egg release the carbon dioxide the chick breathes out? If you take a close look at a chicken egg, you will see tiny holes all over the shell called pores. This is how fresh oxygen replenishes the air cell and carbon dioxide can escape! In this activity, we'll look at how those pores work so the developing chick can breathe! Check out the parts of the egg diagram on the last page to see what each component of the egg is called!



# BREATHING INSIDE THE EGG

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## Directions:

- Pour 1 1/2 cups of water into a large pot or bowl.
- Add 1/4 teaspoon of liquid dish detergent and 1/4 teaspoon of blue food color. Mix well.
- Carefully put the 3 eggs in the pot with the water, dish detergent, and blue food color.
- Make sure that the eggs are submerged in the liquid. If part of the egg is above the surface of the water, mix liquid dish detergent and blue food color with more water in the same proportions as you did before. Add this to the pot/bowl until the eggs are submerged.
- Set a timer for 1 hour or make a note of the time.
- After the eggs have soaked in the liquid for at least 1 hour, carefully lift one of them out of the liquid using the tongs or the large spoon. How does the egg look?
- Crack the raw egg into a cup, being careful not to damage or crush the shell much.
- Set the empty eggshell on a plate or paper towel.
- Carefully inspect the inside of the shell. What do you see?
- Crack open the other two eggs in the same way. Look all around the inside of their shells, too. What do you see? Do all of the insides of the shells look the same? Are there noticeable differences?

**Results:** When chicken eggs are laid, they are warmer than the air outside, so as they cool the membranes slightly shrink. When this happens the two membranes pull apart, leaving behind the small air cell that fills with oxygen. As the chick grows, the chick uses up this oxygen and replaces the cell with carbon dioxide. The tiny pores throughout the shell are what release the carbon dioxide and refill the air cell with oxygen. This is why the dye appears as small dots inside the shell, often in clusters.

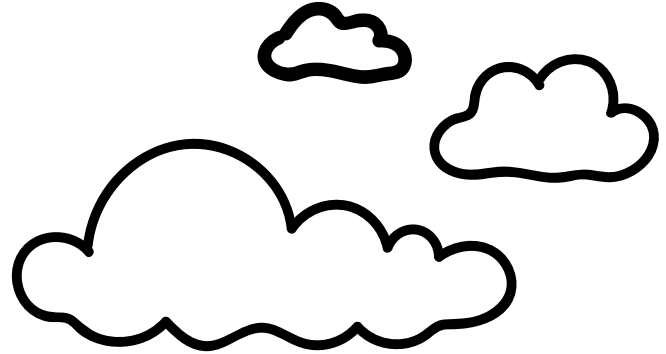


# CONTAINER CLOUDS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

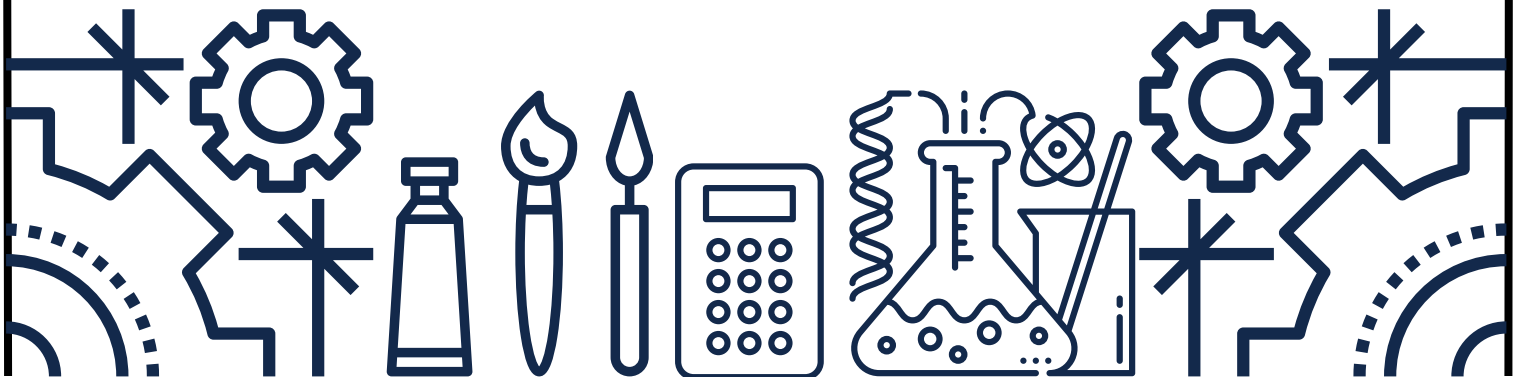
## For this activity you will need:

- Glass jar with a lid
- 1 cup of very hot water
- Blue food coloring
- Hairspray
- 3-5 cubes of Ice



## Directions:

1. Pour 1 cup of hot water into a glass jar.
2. Add blue food coloring to the water and stir.
3. Spray hairspray into the jar on top of the water and immediately close the lid of the jar.
4. Place 3-5 cubes of ice on top of the lid of the jar.
5. Now observe what happens! As time passes you will see a cloud start to form in the top of the jar.
6. After observing your cloud, open the lid of the jar and watch your cloud float off into the air.

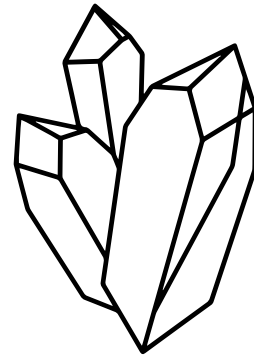


# SUGAR CRYSTALS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

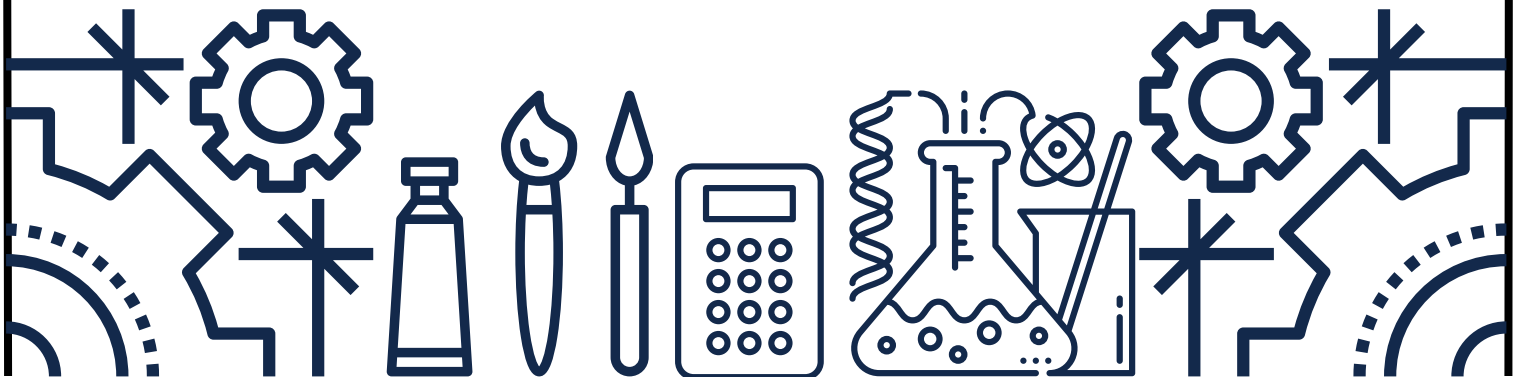
## For this activity you will need:

- 3 cups of sugar
- 1 cup of water
- A popsicle stick, wooden skewer, or string
- Food coloring (optional)
- A jar or glass cup



## Directions:

1. Place the sugar and water into a pan and heat while continuously stirring until the sugar completely dissolves.
2. Add a few drops of food coloring if desired.
3. Allow the sugar solution to cool before pouring the liquid into the jar or cup.
4. Place your popsicle stick or wooden skewer upright into your jar. If using a string, tie your string around the center of the pencil and lay it across the jar with your string hanging into the middle of the jar.
5. Set your container somewhere it won't be disturbed for a few days. You can place a paper towel or coffee filter over your jar to keep the solution clean over the next few days.
6. Let your crystals grow! Over the next few days, you can observe your crystals growing and eat them at the end! Sometimes you'll find them having grown overnight! You've now made your own rock candy sugar crystals!



# LAVA LAMP

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

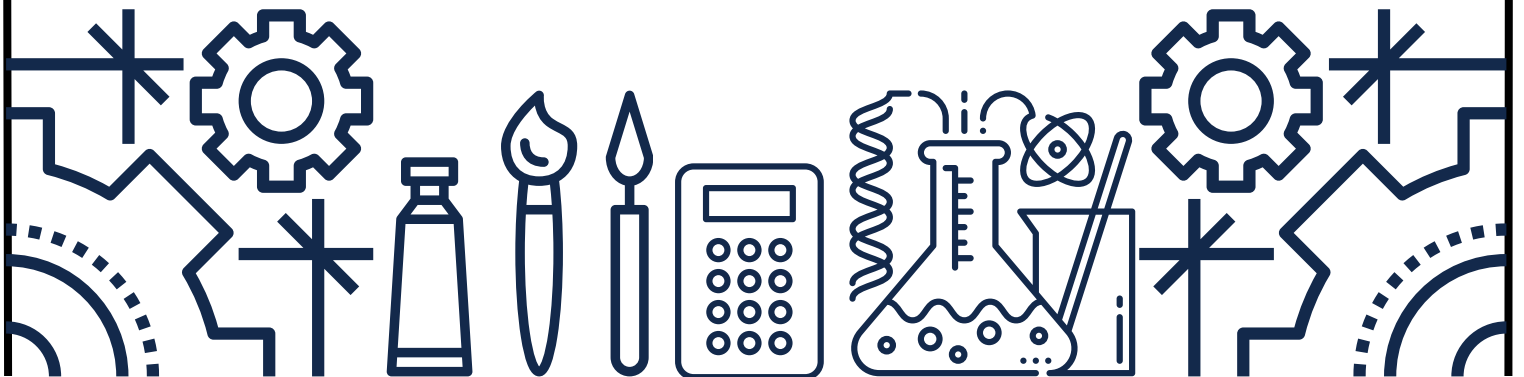
## For this challenge/activity you will need:

- 1 jar or bottle
- 1 cup of water
- 1/2 cup of oil
- Food coloring of your choice
- Alka-Seltzer tablet



## Directions:

1. Measure out 1 cup of water and add it to the jar.
2. Measure out 1/2 cup of oil and add it to the jar.
3. Add 5-6 drops of food coloring to the jar.
4. Add 1 Alka-Seltzer tablet.
5. Watch the chemical reaction take place!
6. If you want to see the reaction again, just add another tablet to your jar!
7. Once the oil and water have settled, place the lid on your jar to store for later use!

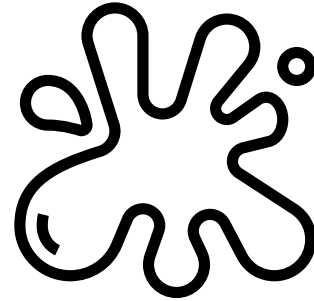


# HOW TO MAKE SLIME

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

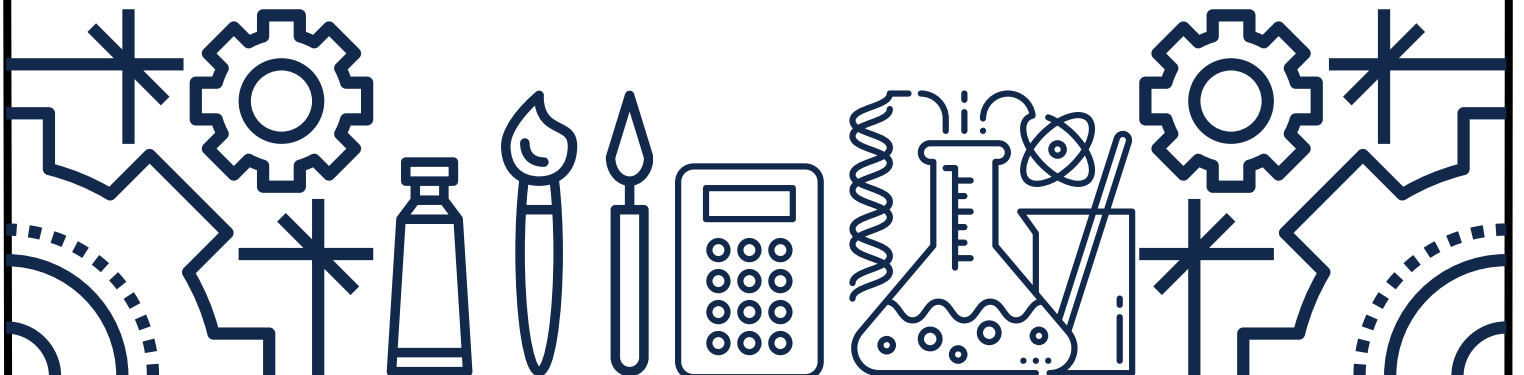
## For this challenge/activity you will need:

- 8 oz bottle of white glue
- Saline solution (activator)
- Baking soda
- Food coloring



## Directions:

1. Add the full bottle of glue to a bowl. Add desired amount of food coloring to the glue and stir until combined
2. Next, mix 1 tablespoon of baking soda into your glue mixture.
3. Add 1 1/2 tablespoons saline solution and mix until combined. If your slime is still too sticky, add 1/2 tablespoon more solution at a time. The more you add, the thicker it'll be. The less you add, the slimier it'll be.
4. Lastly, knead the slime. Using your hands, knead the slime until it is thoroughly combined. It will be wet and gooey at first, but just keep kneading until it all comes together.
5. You can store your slime in a zip-close bag or container to continue to play with!

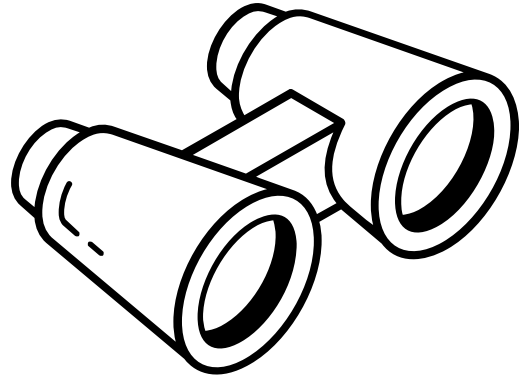


# FLOWER BINOCULARS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

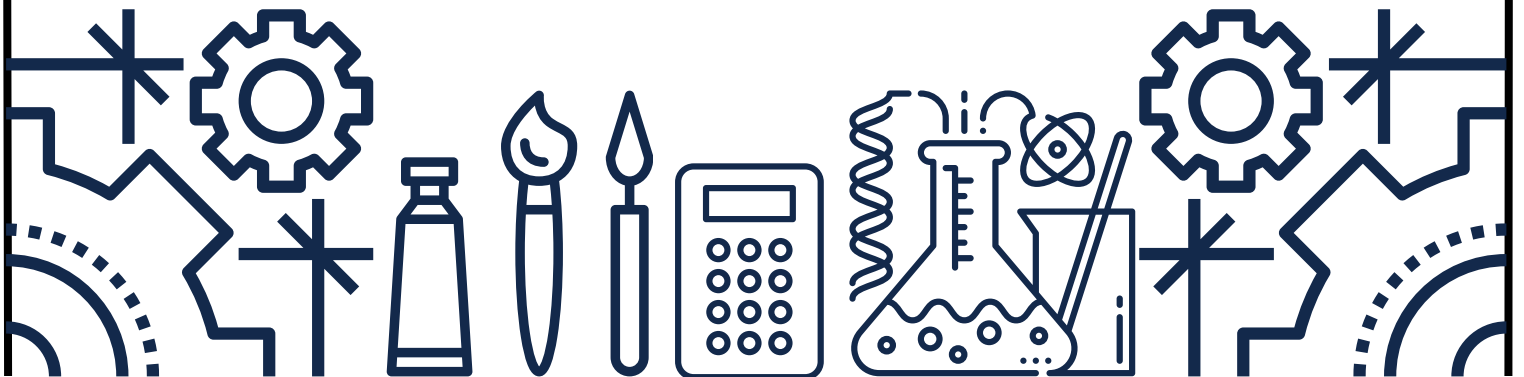
## For this challenge/activity you will need:

- 2 toilet paper rolls
- White acrylic paint
- Paintbrush
- Single hole punch
- Twine or string
- Scissors
- Tape
- Glue
- Flowers from outside



## Directions:

1. First coat the outside of your two toilet paper rolls in white acrylic paint.
2. Once dry, punch one hole near the end of both toilet paper rolls.
3. Collect some flowers from outside and use glue to attach them to the outside of your toilet paper rolls! You can use any flowers and decorate it how you'd like!
4. After the glue is dry take one end of your string or twine and thread it through the hole punch on one of the toilet paper rolls. Tie a knot to make sure the string is secure. Repeat this step with the other end of your string or twine with the other toilet paper roll. This is your strap.
5. Lastly, tape your two toilet paper rolls, side by side, with the hole punches on the outside of your binoculars.

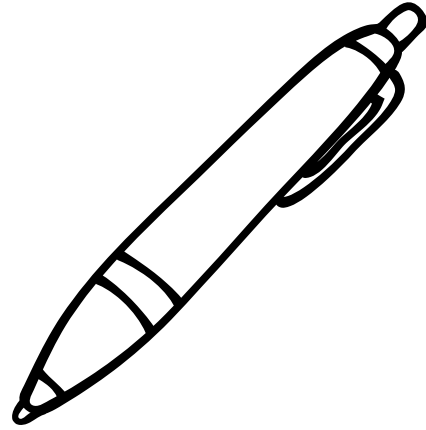


# INVISIBLE INK

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Cotton swabs
- Lemon/lemon juice
- Water
- Lamp or flashlight
- Plain white paper
- Bowl

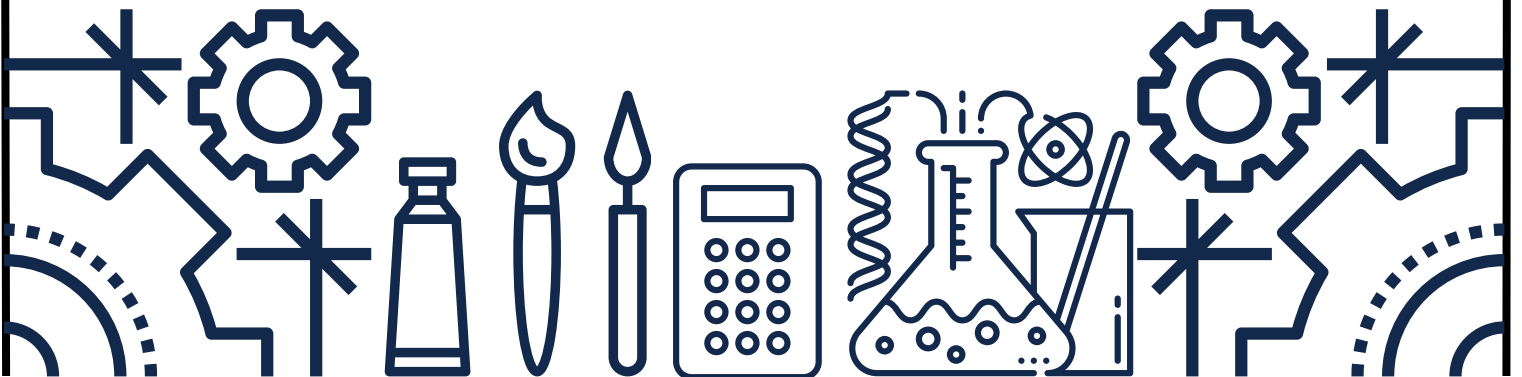


## Directions:

1. Squeeze the juice from one lemon into a bowl, add in a few drops of water and mix.
2. Dip your cotton swab into the lemon and water mixture and use it to write a secret message on your paper!
3. Wait for the paper to completely dry for your "ink" to become invisible.
4. Hold your paper close to a lamp, flashlight, or lightbulb to reveal your invisible message!

## The Science:

Lemon juice contains carbon compounds that are colorless when at room temperature. The heat from the light bulb breaks down the compounds and releases the carbon. The carbon oxidizes when it comes into contact with the air and turns brown, making your invisible message visible from the heat of the light!



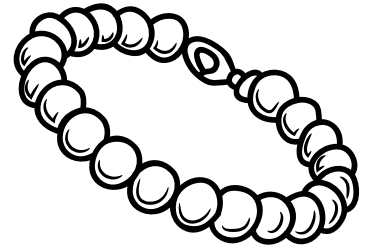


# BINARY BRACELETS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this challenge/activity you will need:

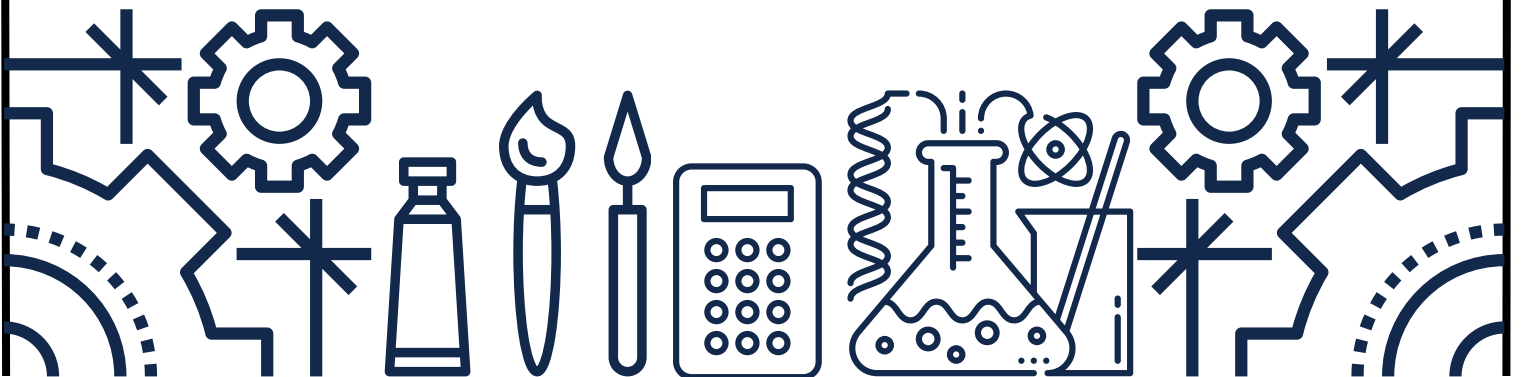
- 2 sets of colored beads (any two colors you like)
- String
- Scissors



## Introduction:

For the month of March, we will explore contributions to STEM by historical women in honor of Women's History Month. Before participating in this week's challenge, learn more about [Ada Lovelace](#), who wrote the first algorithm to find Bernoulli numbers and is considered to be the first computer programmer.

After learning about Ada Lovelace, follow the instructions on the next page to make a binary bracelet that spells your name or nickname! Use the key to write out each letter of your name in binary code.



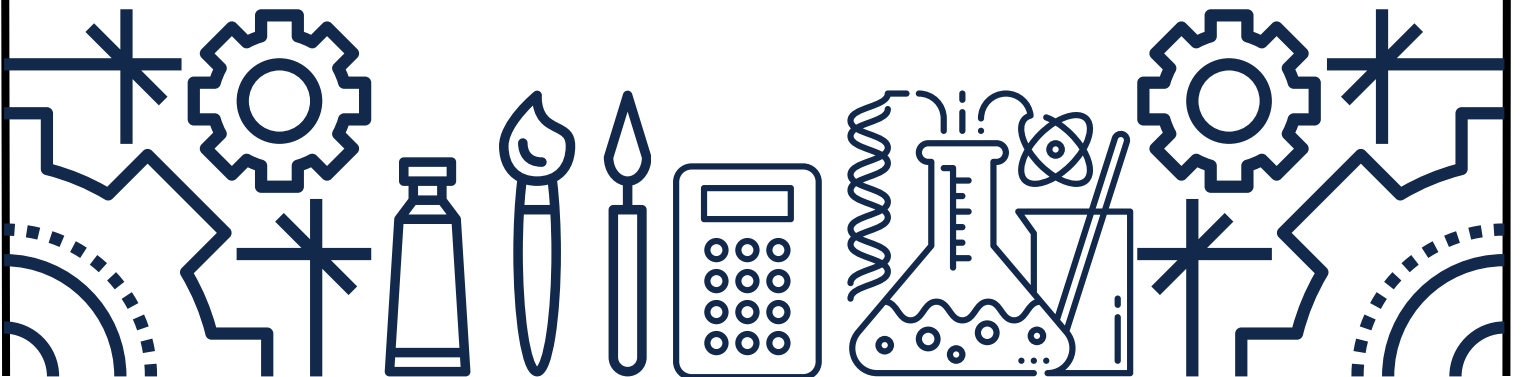
# BINARY BRACELETS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## Directions:

- Write out your name or nickname on a piece of paper.
- Use the binary letter key on the next page to write out your name in binary code.
- Choose one color of bead to represent the white squares (signifying "1") and another color to represent the black squares (signifying "0"). Between each letter, you can add an extra bead in any color of your choice as a divider. A separating marker like this in computer science is called a "delimiter."
- Cut a string to the size of your wrist, with a few extra inches added. Make a knot at one end, this will be the start of your code.
- Add your beads to your bracelet in the order you wrote out in step 2.
- Once you have added all of your beads, tie the two ends together, leaving enough space to slip it over your hand.
- Your bracelet is now done!

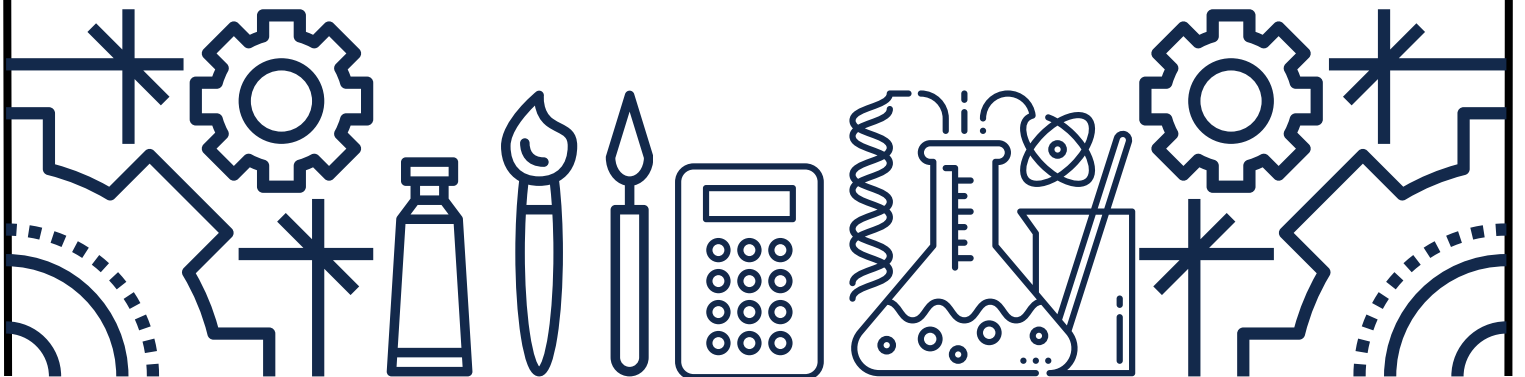
**\*You can also make a binary necklace if you have a longer code**



# BINARY BRACELETS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

A	■□■ ■■■□	N	■□■ □□■
B	■□■ ■■□	O	■□■ □□□
C	■□■ ■■□□	P	■□□ ■■■
D	■□■ ■□■	Q	■□□ ■■□
E	■□■ ■□□	R	■□□ ■■□
F	■□■ ■□□■	S	■□□ ■■□□
G	■□■ ■□□□	T	■□□ ■□■
H	■□■ □■■	U	■□□ ■□□
I	■□■ □■□	V	■□□ ■□■
J	■□■ □■□■	W	■□□ ■□□□
K	■□■ □■□□	X	■□□ □■■
L	■□■ □□■	Y	■□□ □■■□
M	■□■ □□■□	Z	■□□ □■□



# LEAPING POLLEN

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this challenge/activity you will need:

- Scissors
- Construction paper
- Balloon

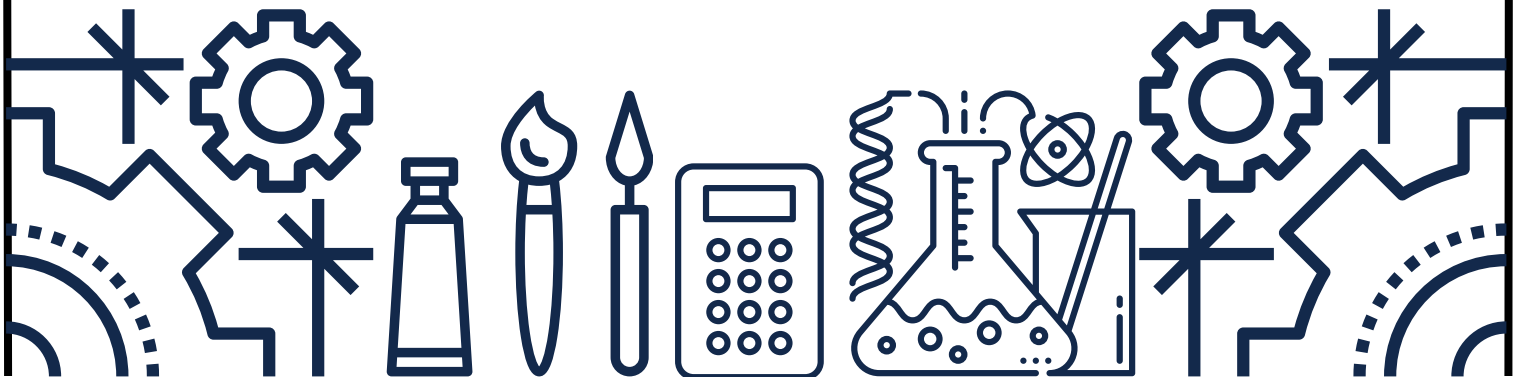


## Introduction

Bees and flowers have a very special relationship. Pollination is the transfer of pollen from one flower to another causing fertilization and reproduction. Bees and other insects are called pollinators when they carry pollen on their bodies and help pollinate. This activity shows how a charged balloon behaves like the body of a bee making a pollen leap from a flower.

## Directions:

1. Make a flower: Use scissors to cut a flower shape out of the construction paper.
2. Make your pollen: Cut or tear pieces of tissue into small confetti-like pieces and make a pile in the center of your paper flower.
3. Make the bee: Blow up your balloon and tie the end. You are welcome to decorate the balloon like a bee. Rub your “bee” on your hair or sweater for at least 10 seconds.
4. Hunt for pollen: Hold your “bee” near the flower with the pollen but don’t touch them together. What happens?

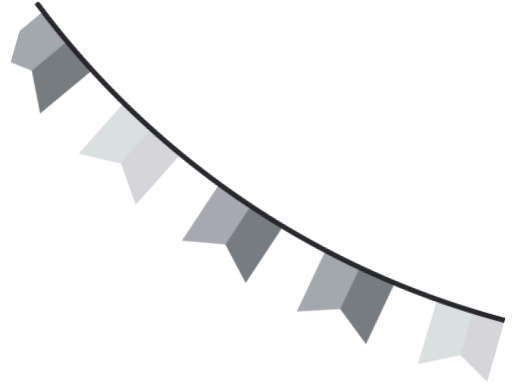


# PAPEL PICADO

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this challenge/activity you will need:

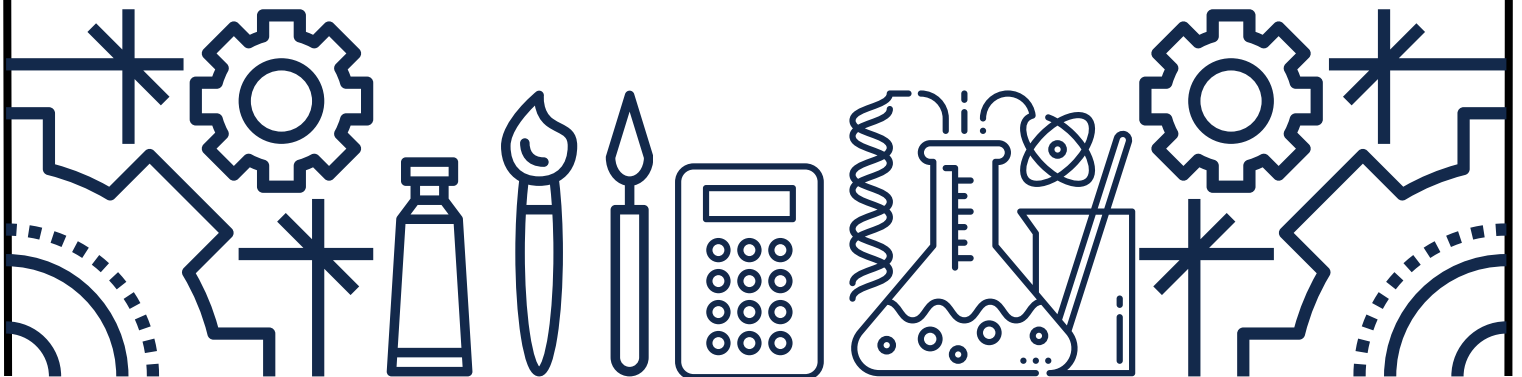
- Tissue paper (at least three different colors)
- Masking tape
- Scissors
- Papel picado template



## Introduction:

Cinco de Mayo, or the fifth of May, is a holiday that celebrates the date of the Mexican army's May 5, 1862 victory over France at the Battle of Puebla during the Franco-Mexican War. Cinco de Mayo is also known as Battle of Puebla Day. While it's a relatively minor holiday in Mexico, in the United States, Cinco de Mayo has evolved into a commemoration of Mexican culture and heritage, particularly in areas with large Mexican-American populations ("Cinco de Mayo," 2023). For this STEAM Challenge, you will learn how to make a papel picado, meaning "punched paper!" Papel picado garlands are hung up during celebrations. Follow the instructions on the next page to make your own.

History.com. (2023, April 20). *Cinco de Mayo*. HISTORY. Retrieved May 5, 2023, from <https://www.history.com/topics/holidays/cinco-de-mayo>

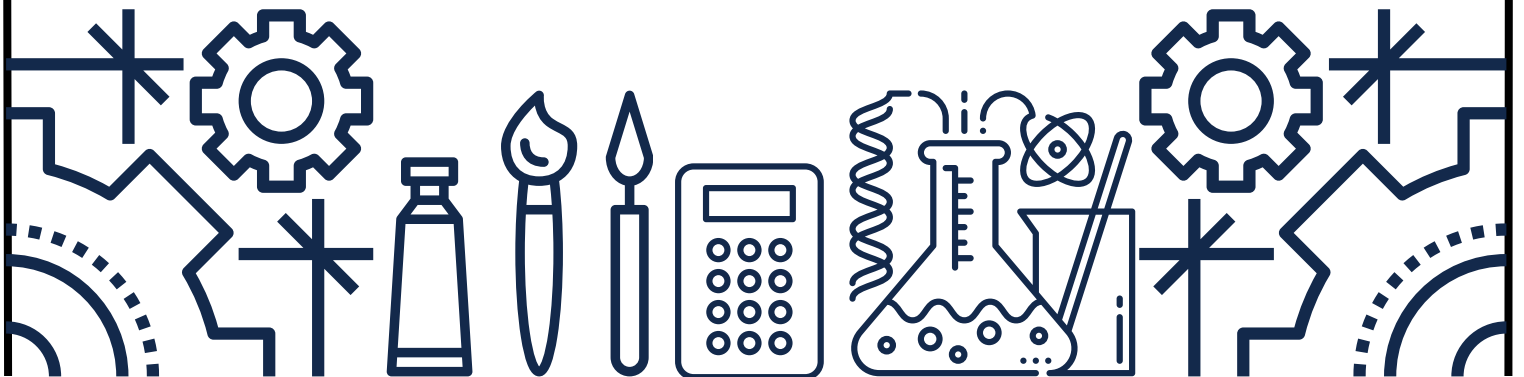


# PAPEL PICADO

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## Directions:

1. First, fold your printed template of a papel picado, if you are using one, down the middle (along the dotted line). Fold the tissue paper in half and assemble a 'book' with the template sheet as the cover (you can use four tissue papers at a time). To make sure your tissue paper doesn't slip, you can add a piece of masking tape to secure your template.
2. You're now ready to start cutting out your papel picado! Just like if you were making paper snowflakes, carefully cut out the shapes from the template. When you've finished cutting, remove the masking tape from the top, flatten out your book, and remove the template cover. Repeat this process with another four sheets of tissue paper. Feel free to make as many as you want for a bigger garland!
3. Unroll as much of the masking tape to fit all of your papels and lay it out on a flat surface with the sticky side facing up. Carefully place the papels face down on the tape in alternate colors. The tops of the papels should only cover half of the width of the masking tape. Next, fold the tape over onto itself to secure your papels.
4. You have now made your very own papel picado garlands!



# BUG HOTEL

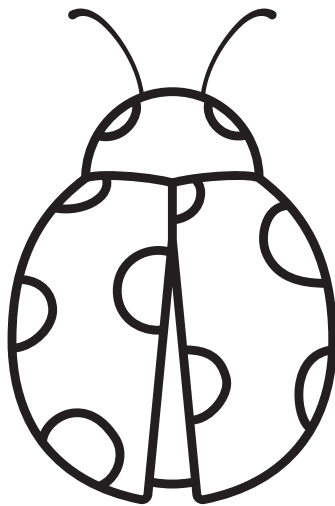
SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this challenge/activity you will need:

- Milk carton, milk jug, or any other waterproof container
- Natural materials (twigs, leaves, flowers, etc.)
- Recyclables (toilet paper roll, popsicle sticks, etc.)

## Introduction:

April 22nd is Earth Day, so what better time than now to make a DIY Bug Hotel! Whether you like bugs and creepy crawlies or not, they play a very important role in our ecosystem. Building a house for the bugs around you gives them protection from the elements. Insects are needed for pollination of flowers and vegetables and help protect against bugs that may damage the land. Even if you live in a city, creating a home for bugs is just as important! Allowing shelter for pollinators in urban centers is crucial for the environment. Follow the instructions on the next page to make your own bug hotel!



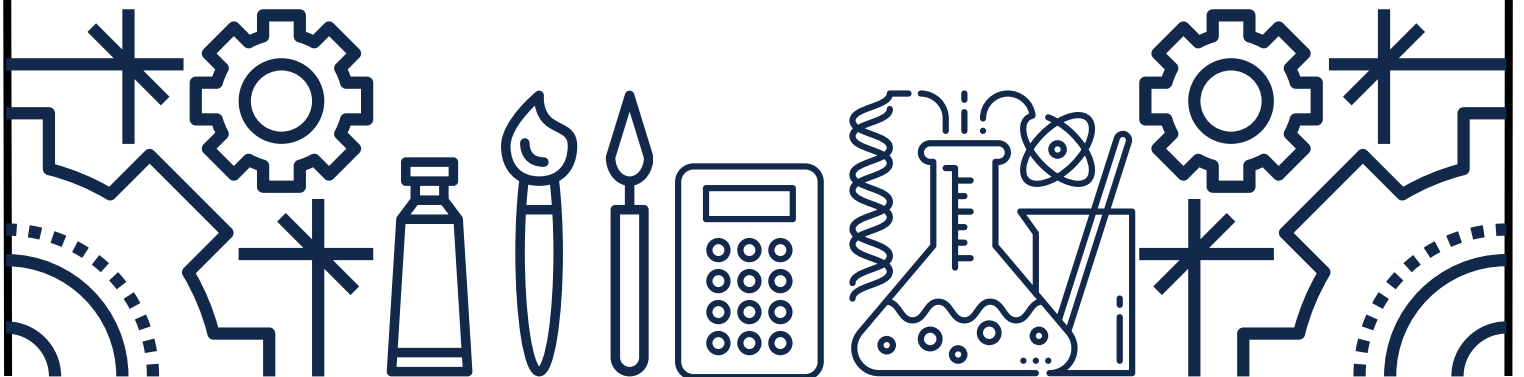
# BUG HOTEL

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## Directions:

1. First, go out into your yard, garden, or a park near you. Using a bag or box, collect as many natural materials as you think you'll need to make your bug hotel. Some examples would be twigs, shells from nuts, leaves, pinecones, flowers, grass, and more!
2. Next, check your recycling for a milk jug, milk carton, or another recycled item big enough for your hotel that is also waterproof.
3. While checking your recycling, see if you can find any other materials to put inside your bug hotel like toilet paper rolls, cardboard, popsicle sticks, etc.
4. Now it's time to build! Be inventive! If you are using an item like a milk carton for your hotel, you may need to cut one side to allow bugs to enter and a place to put your materials.
5. If you feel like it, you can always decorate the outside of your hotel and even give it a name!
6. Once you are done, find a place in your yard, garden, or porch to set up your bug hotel. Now your hotel is open for business!

**\*You can always search for bug hotels online to get ideas for your own hotel**





# ART THAT MATTERS

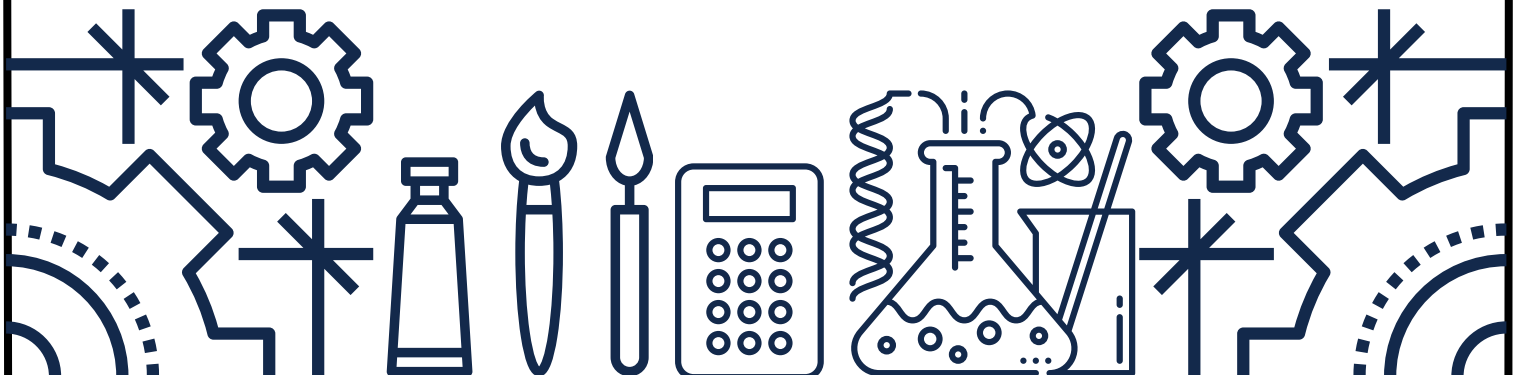
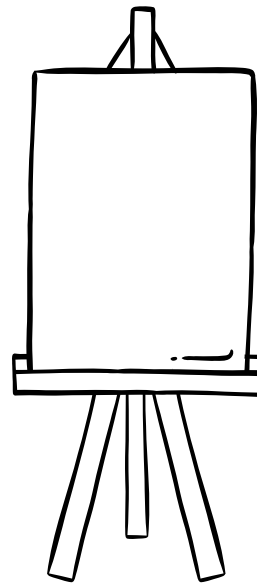
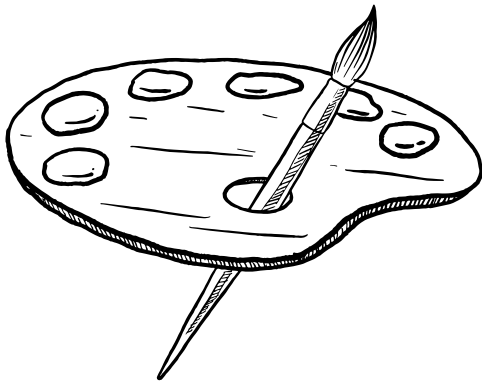
SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Paper
- Drawing supplies (crayons, markers, paint, colored pencils, etc.)
- Any other art supplies you like!

## Directions:

Throughout the month of March, we explored contributions to STEM by historical women for Women's History Month. For this STEAM challenge, we are going to honor the women in your life! Think of a woman or women in your life who inspire or motivate you and make an art project(s) in their honor. This could be a drawing, painting, collage, or anything else you can come up with!

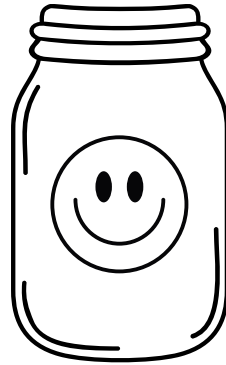


# MINDFULNESS IN A JAR

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Jar or bottle
- Water
- Clear glue
- Three colors of glitter

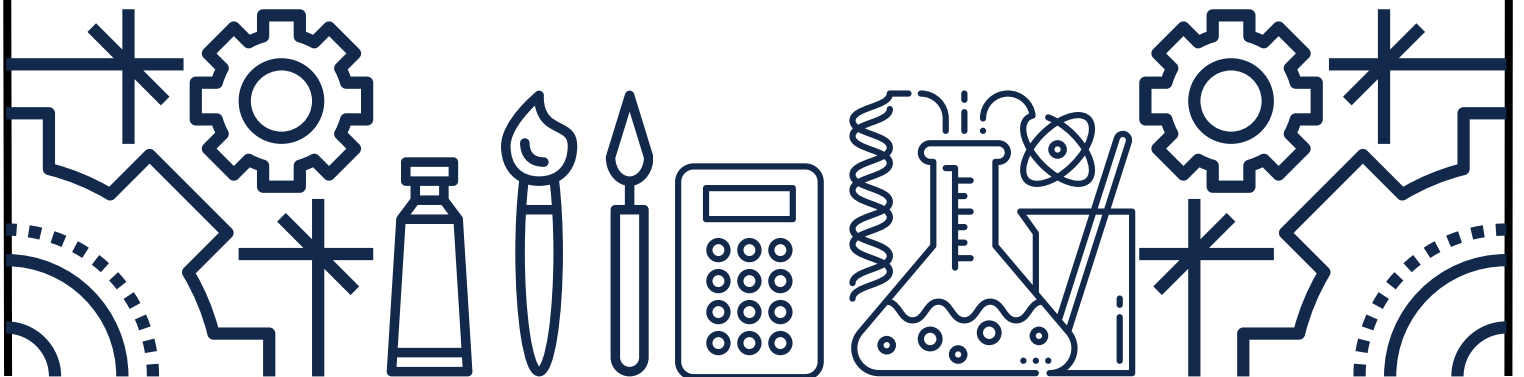


## Introduction:

April is National Stress Awareness Month, so for this week's activity, you will be making your own mindfulness jar! Managing stress is essential to a healthy lifestyle, your mindfulness jar can be used to help recognize how you are feeling and ground yourself back to the present to reduce stress.

## Steps to Make:

1. Add clear glue to the container. The more glue you use, the longer it will take for the glitter to settle down. An average amount is just enough to cover the bottom of the container.
2. Add in your glitter. You should have three different colors of glitter to symbolize our thoughts, feelings, and behaviors.
3. Fill the rest of the container with water and put on the lid tightly.
4. Follow the directions on the next page to learn how to use your mindfulness jar.

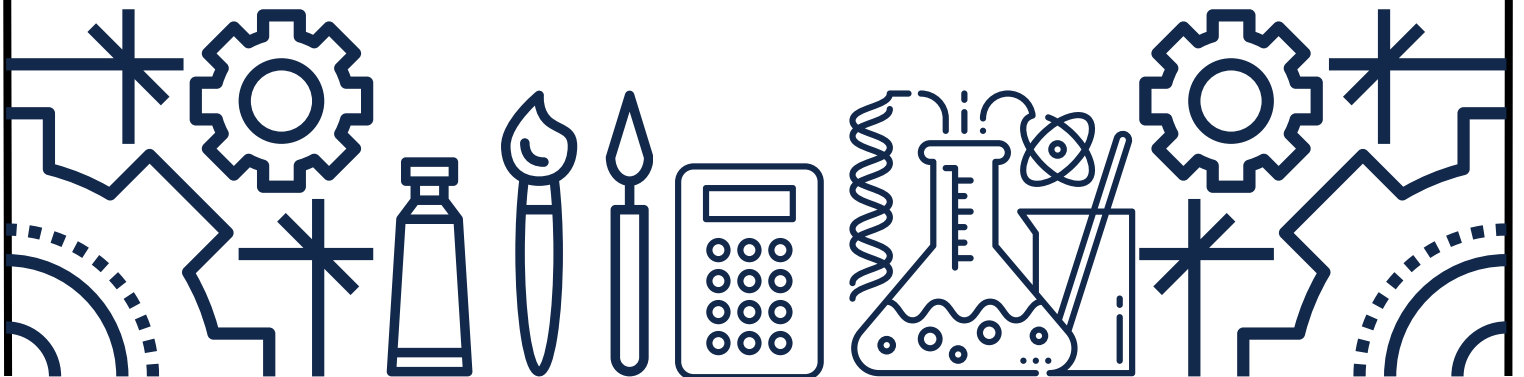


# MINDFULNESS IN A JAR

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## Directions:

- When the container is still, look at the glitter settled at the bottom of the jar and notice how the water throughout the rest of the jar is clear.
  - **When we are calm, our mind is like this jar. We can think clearly and aren't weighed down by overwhelming emotions.**
- Give the container a strong shake and watch as the glitter swirls around the jar. The jar is now like our mind when we become stressed, anxious, angry, or any other big emotion.
  - **Our mind becomes cloudy and can even seem chaotic when we feel these emotions, just like the glitter in the jar.**
- Now focus on the three colors of glitter. One color is our thoughts, the second is our feelings, and the third is our behavior. All three of these things are intertwined and affect one another. Take some time to think about what each color represents for you in that moment and how they are affecting one another.
  - **Ask yourself "What kind of thoughts are going through my head?", "What emotion(s) am I feeling right at this moment?", and "How am I behaving?"**
- Take deep breaths as you watch the glitter settle back down to the bottom of the jar. Once it has settled, ask yourself those questions again. Be patient with yourself, your emotions, and those around you.



# STRESS BALL

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

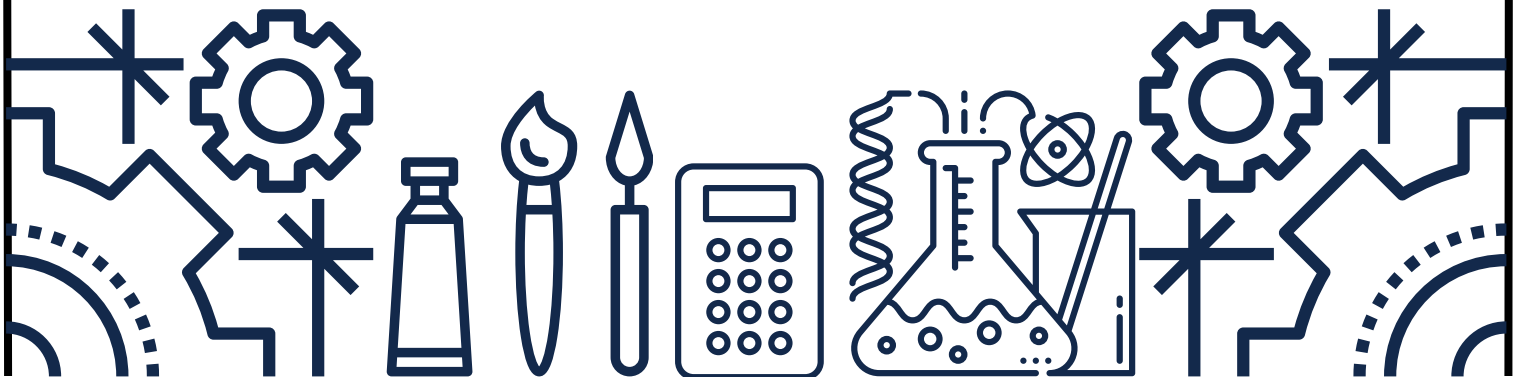
## For this activity you will need:

- Balloon
- Empty water bottle
- Funnel (or paper rolled into a funnel)
- Flour



## Directions:

1. Put your funnel into the top of the water bottle.
2. Pour flour into the water bottle using the funnel.
3. Take the funnel out of the water bottle.
4. Stretch the opening of the balloon and fit it over the top of the water bottle.
5. Turn the water bottle upside down and gently squeeze to push the flour into the balloon (make sure to use some pressure because the air will help open up the balloon to make space for more flour).
6. After you put enough flour to make the sized stress ball you would like, pinch the balloon and release it from the water bottle.
7. Make sure there is no air left in the balloon and tie it shut.
8. Now you have your own stress ball!



# NOISE MAKING CUPS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- 1 paper or plastic cup
- Sharp pencil or push pin
- 18-inch piece of dental floss
- Paper clip

## Directions:

- Use the pencil to poke a small hole in the bottom of the cup.
- Tie the dental floss to one end of the paper clip.
- Thread the dental floss through the hole so that the paper clip is on the inside of the cup.
- Hold the cup in one hand. Pinch the dental floss between your fingers with the other hand.
- Slide your fingers down the dental floss.

**What happened?**

**Were you able to make the cup scream?**

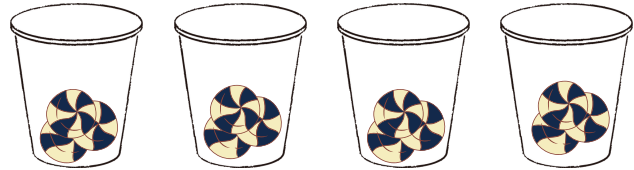


# DISAPPERING CANDY

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

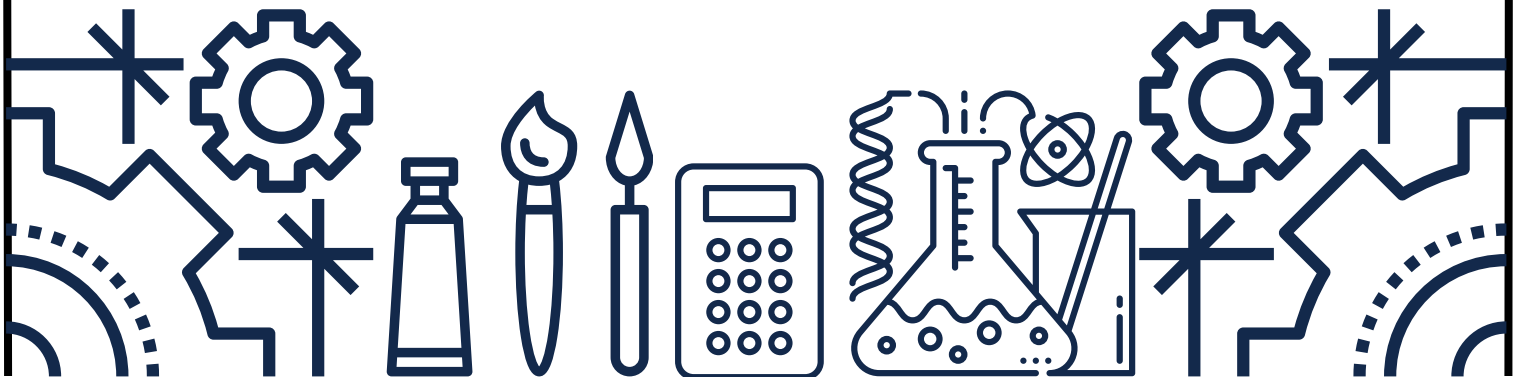
- Non-chocolate candy
- Water
- Milk
- Vegetable oil
- Vinegar
- 4 small cups



## Directions:

1. Pour the same amount of one of the liquids in each cup.
2. Drop a piece of candy (the same kind) into each cup.
3. Watch and see what happens.

**Ask yourself:** Which liquid made the candy disappear first? Which liquid changed the candy the least? Leave the cups and observe what happens of the next few hours. Did anything change?

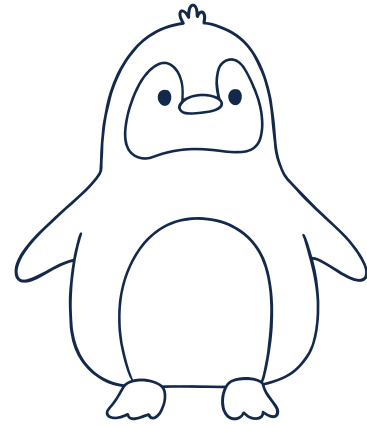


# PENGUIN INSULATION

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- 4 zip-close quart plastic bags
- 1 large bowl
- Ice cubes
- Cold water
- Vegetable shortening, margarine or softened butter
- Spatula



## Directions:

1. Fill the bowl with water and ice cubes and set aside.
2. Take one zip-close bag and turn it inside out.
3. Use the spatula to carefully coat the outside of that bag with vegetable shortening or margarine.
4. Place the coated bag inside another bag and seal it.
5. Turn a clean bag, inside out. Place it inside another clean bag and
6. seal it.
7. Place one hand in each bag. Then place your bag-covered hands in the bowl of ice water.

**Which hand gets cold faster? How do your hands feel?**

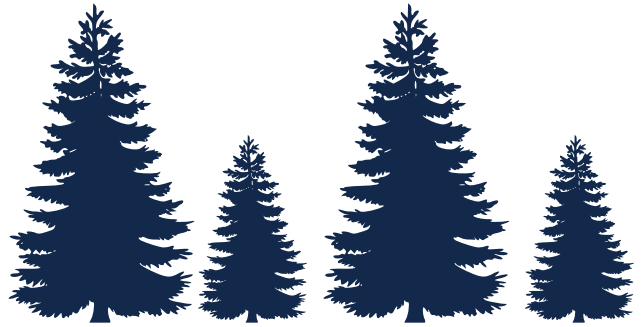


# 3-D EVERGREEN FOREST

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

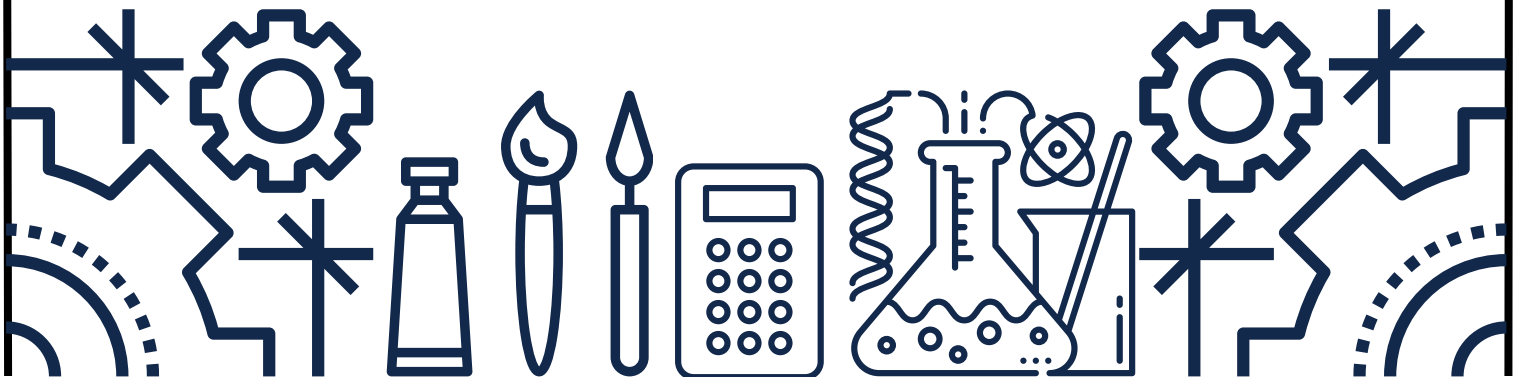
## For this activity you will need:

- Paper
- Pencil
- Scissors
- Ruler, optional
- Markers, optional



## Directions:

1. Fold the paper in half.
2. Leave the paper folded and sketch an evergreen shape touching the fold.
3. Cut out the tree shape. Leave it folded.
4. Use the ruler to draw lines from the fold to about 1/4 inch from the edge of the paper.
5. Cut along the lines.
6. Fold every other section up, creasing firmly.
7. Open the paper tree.
8. Gently pull the sections that were folded up to the back and crease again.
9. Set the tree on the table. Trim the bottom if necessary to make it stand more upright.
10. Repeat the steps to create more trees.



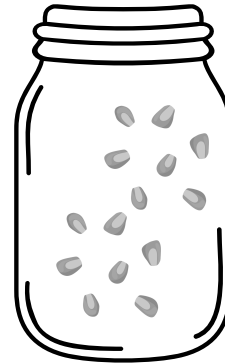


# DANCING POPCORN

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Popcorn kernels
- Large jar
- Water
- Baking soda
- Vinegar
- Vegetable oil, optional
- Antacid (calcium carbonate) tablet, optional



## Directions:

1. Fill your jar about 1/2 full with water.
2. Stir 1-2 tablespoons of baking soda into the jar.
3. Stir about 1/4 cup of popcorn kernels in, mixing well.
4. VERY SLOWLY pour about 1/2 cup of vinegar into the jar.
5. Watch the popcorn dance up and down. Put on some music if you want.

\*\* Try the experiment again using oil instead of water or using antacid tablets instead of baking soda. See what happens.

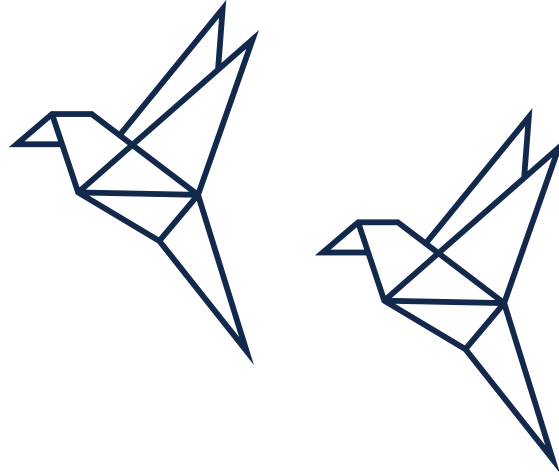


# FLYING BIRD

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Paper
- Scissors
- Tape
- Paper clip
- Rubber band



## Directions:

1. Fold the paper in half lengthwise (hamburger style).
2. Open the paper and cut it in half.
3. Take one half and fold it accordion style. This will become the tail.
4. Fold the other half into an airplane to make the bird's body.
5. Cut about 1 inch off of the accordion half perpendicular to the folds.
6. Then fit the accordion into the back of the airplane.
7. Tape the back of the airplane closed around the accordion tail feathers.
8. Tape the end edges of the accordion tail feathers to the wings of the airplane.
9. Now cut a small slit about a paperclip's length from the nose of the airplane (bird beak). This is where the paperclip will slide in. Bend the outer end of a paperclip out about 30 degrees and slide the inside end through the slit you just made.
10. Pull back the rubber band and launch your bird.

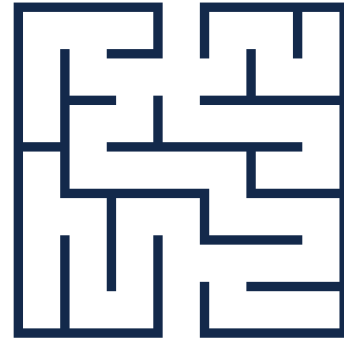


# MARBLE MAZE

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Cardboard box
- Craft sticks
- Hot glue
- Pencil
- Marbles



## Directions:

1. Start by using your pencil to sketch where you want to glue the craft sticks to make your obstacle course.
2. Glue two craft sticks on top of each other for extra strength. Repeat until you have enough for your maze.
3. Begin gluing the thin sides of the craft stick pairs to the inside of the cardboard box, where you sketched your maze, using your hot glue.
4. Have an adult help cut craft sticks with scissors if you need shorter sizes.
5. Once your course is complete, angle your box so that your marble can roll through your course. Drop the marble at the starting point and watch it roll! Try moving your box around to get your marble to complete the marble run!

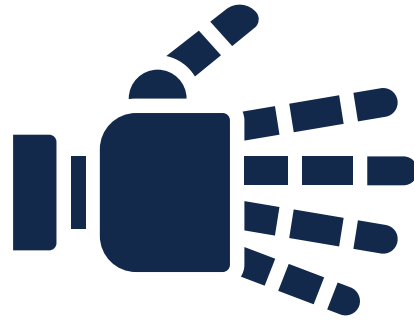


# ROBOTIC HAND

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

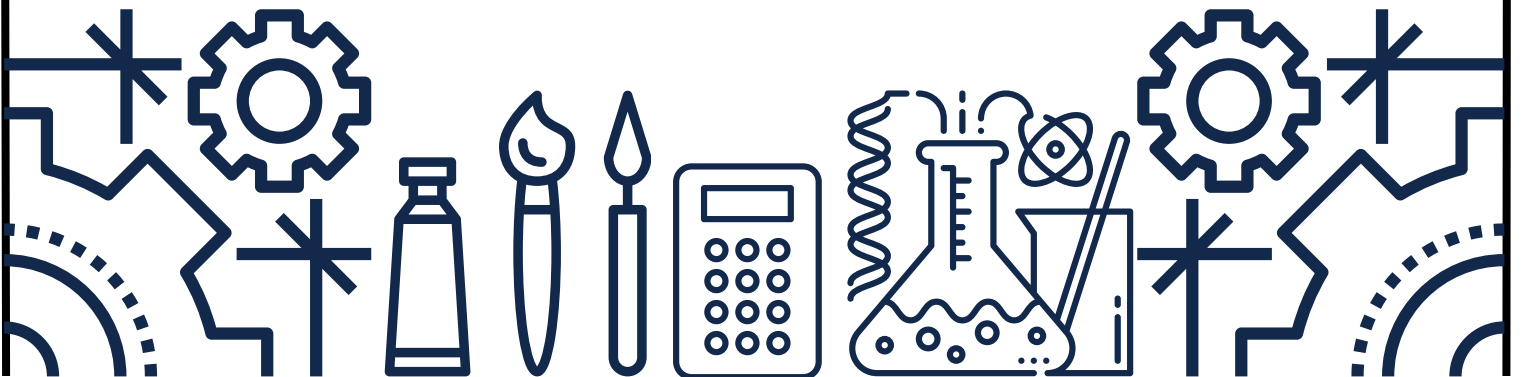
## For this activity you will need:

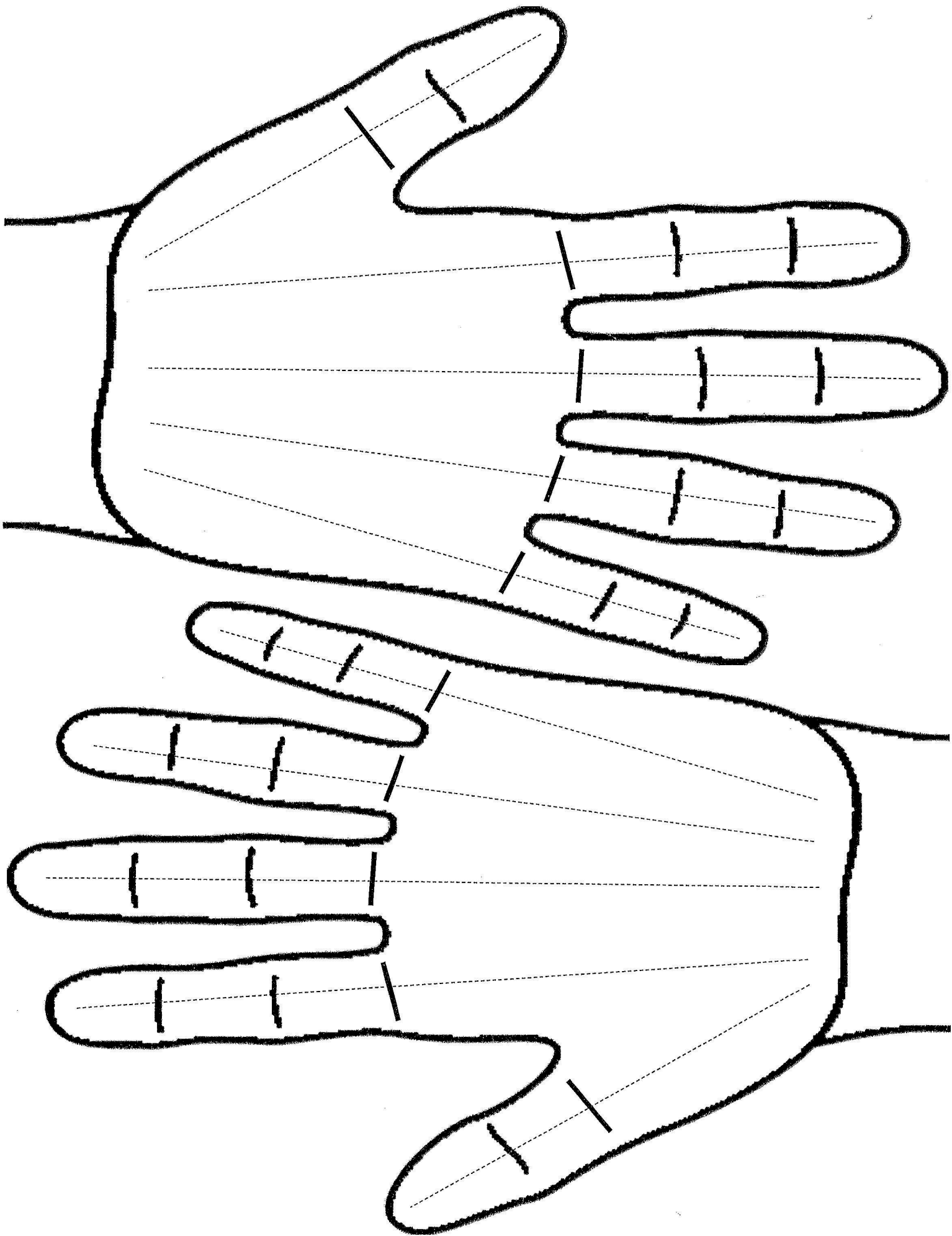
- 5 Straws
- Tape
- String
- Paper gand



## Directions:

1. Cut out your paper hand (use the template on the next page).
2. Decorate the back of your paper hand (blank side).
3. Bend each finger and thumb at the solid black line (toward you).
4. Cut straws so that they are smaller than each section of the finger.
5. Tape down each straw piece with a small piece of tape (lined side).
6. Tape down the tip of the strings to the back of each fingertip.
7. Thread each string through the straws for each finger.
8. Pull the strings to make your robotic hand move.



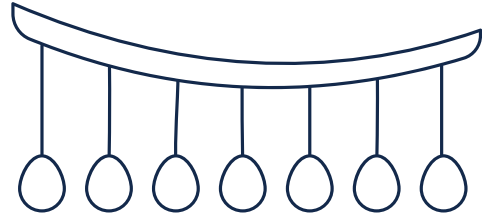


# RECYCLED WINDCHIMES

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- A small branch or stick from outside
- String or twine
- Beads
- Bottle caps
- Push pin



## Directions:

1. Find a small branch or stick from outside. This will be what you hang the chimes you make from.
2. Cut four or five strings or twine to whatever length you would like for your windchime (they don't have to all be the same length).
3. Leaving about four inches at the top, tie a knot in your string. This will be where your beads/bottle caps start.
4. Gently (with an adult's help if needed) use the push pin to poke a hole in the center of your bottle caps to be able to string them up.
5. Using your bottle caps and beads, string them onto your string/twine in any pattern you would like, ending on a bottle cap.
6. Once your strings are packed full with beads and bottle caps, tie the end of your string off multiple times to make a knot big enough to hold the last bottle cap in place.

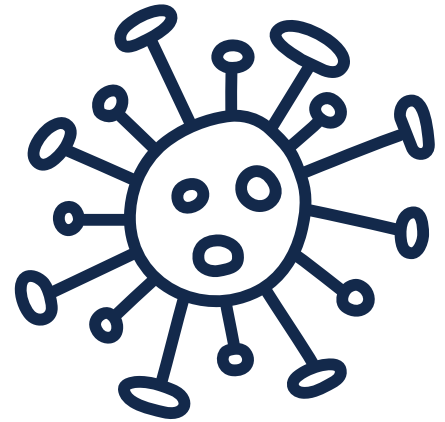


# HOW DOES SOAP GET RID OF GERMS

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Large, shallow dish
- Black pepper
- Liquid soap
- Water

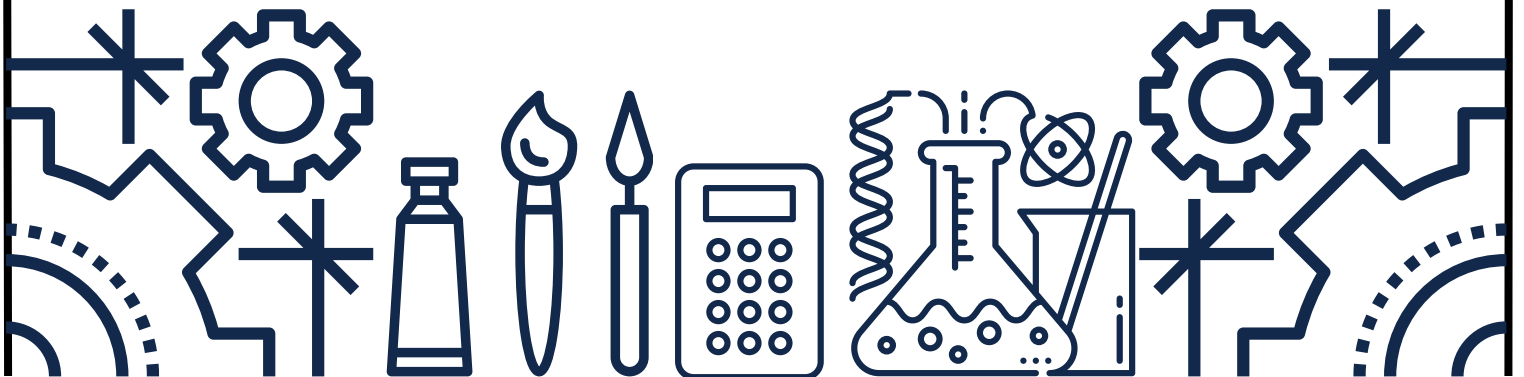


## Directions:

1. Fill the dish with water not quite to the top.
2. Sprinkle some pepper all over the surface of the water.
3. Dip a finger into the liquid soap.
4. Watch as the pepper moves away from the soap.

## What is happening:

In this demonstration, the pepper represents germs or bacteria. At first, the pepper is all over the water. The water does not repel, or push the pepper away all by itself. When soap is added, it lowers the surface tension of the water. This is what makes the pepper move away. When soap is used to wash things, it makes germs and bacteria move away too.



# MODEL OF THE HUMAN EYE

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

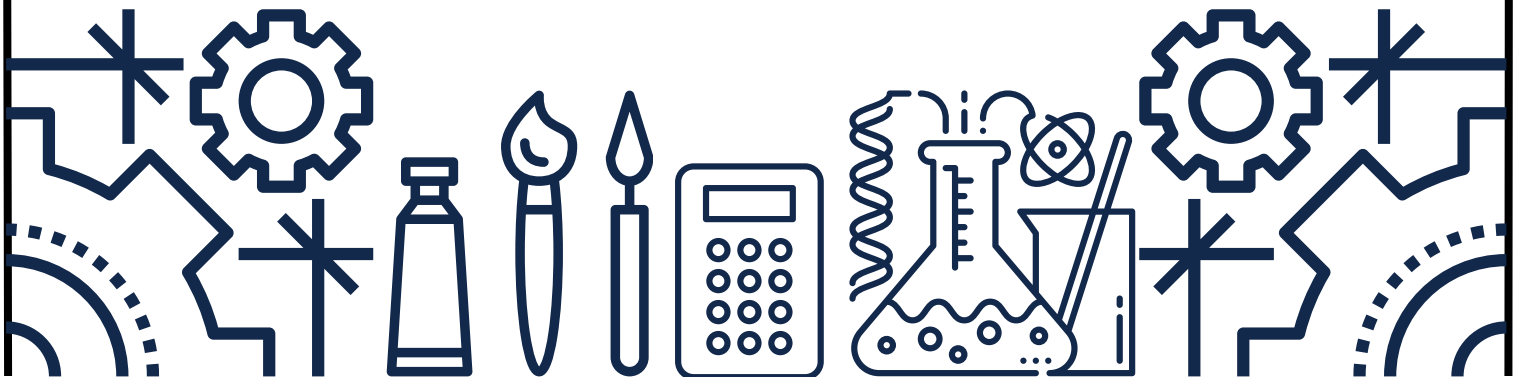
## For this activity you will need:

- Small paper or styrofoam bowl
- Red, black yellow, blue, brown, and green markers
- Straw
- Scissors
- Tape



## Directions:

1. Cut the rim off of the paper or styrofoam bowl. This is the sclera.
2. Cut a small (1-inch diameter) semi-circle out of the edge of the bowl. This represents the pupil.
3. Draw a 1/2-inch thick semi-circle around the hole to represent the iris. Use blue, brown, or green. Add thin black lines if you wish.
4. Look through the hole you cut. Directly behind it, draw a black dot on the inside of the bowl. This is the fovea. Add a dotted line in a circle around it to represent the macula.
5. Draw some red lines coming from the bottom of the bowl out around the macula. These represent the blood vessels.
6. The straw represents the optic nerve. Cut a short piece off the straw. Carefully make a small hole just above the dotted line. Insert the piece of straw and tape it to secure it.
7. Use a yellow marker to draw several small yellow ovals on the outside edge of the bowl above the colored semi-circle. This is the lacrimal gland which makes tears.





# MODEL STETHOSCOPE

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

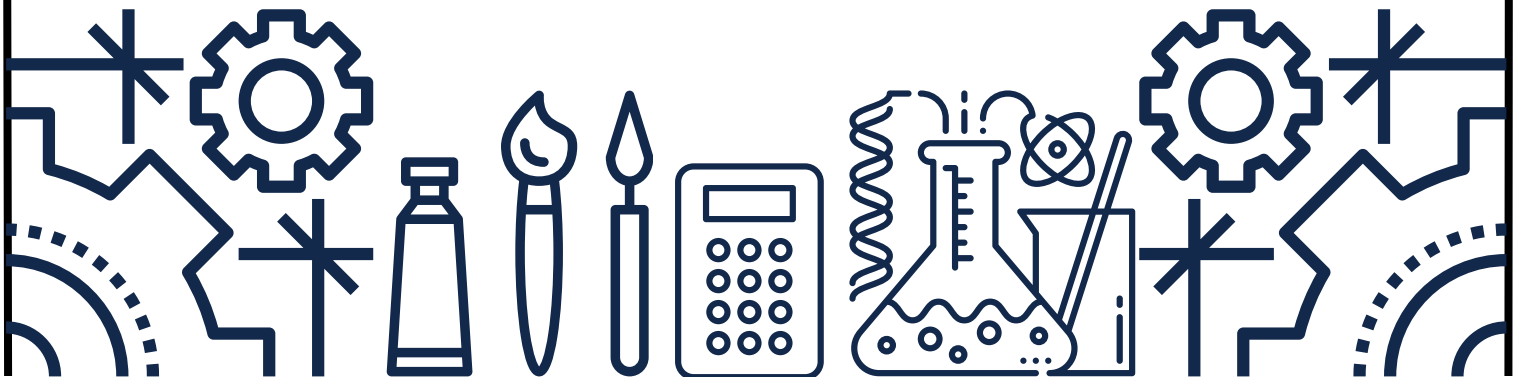
## For this activity you will need:

- Paper towel tube/2 toilet paper tubes taped together
- Balloon
- Top of one plastic bottle
- Paper or plastic cup with a bottom larger than the tube
- Rubber band
- Scissors
- Tape



## Directions:

1. Take the lid off the water bottle and cut the top off about two inches down. Keep the top and recycle the bottom.
2. On the bottom of the cup, trace around the cardboard tube and cut out the circle.
3. Cut the neck off the balloon and stretch it over the cut end of the water bottle. Secure the balloon with a rubber band and tape.
4. Insert the water bottle top into one end of the cardboard tube and use tape to secure it.
5. Insert the other end of the cardboard tube into the cup and tape to secure it.
6. Take your stethoscope and ask to listen to someone's heart.

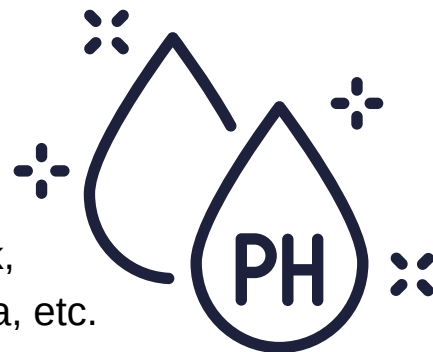


# TURMERIC PH INDICATOR

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

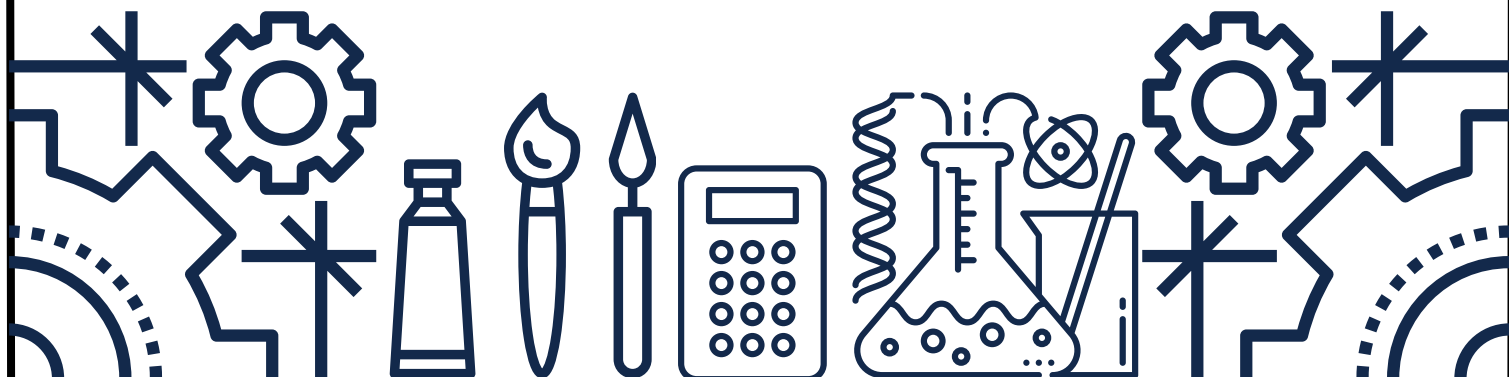
## For this activity you will need:

- Turmeric powder
- Rubbing alcohol
- Jars or cups
- Common household liquids: Vinegar, lemon juice, milk, liquid soap, apple juice, baking soda water, clear soda, etc.
- Measuring cups and spoons



## Directions:

1. First, prepare the turmeric indicator solution by mixing 1/4 teaspoon of turmeric powder in 1/4 cup of rubbing alcohol. Stir well to mix completely.
2. Pour a small amount of each liquid you would like to test into a separate jar or cup. Add 1/4 teaspoon of the turmeric indicator to the liquid and observe what happens.
3. If the liquid turns a deep red color, the liquid is basic with a pH above 7.0. If the liquid remains yellow, the liquid is acidic with a pH below 7.0. Try changing the deep red color back to yellow by adding an acidic liquid (lemon juice and vinegar work well).

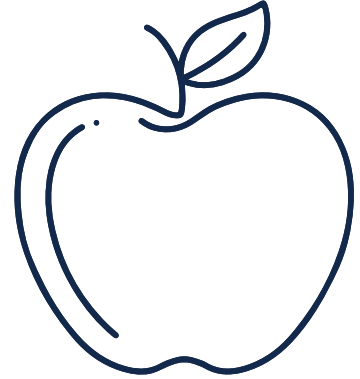


# APPLESAUCE OOBLEK

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

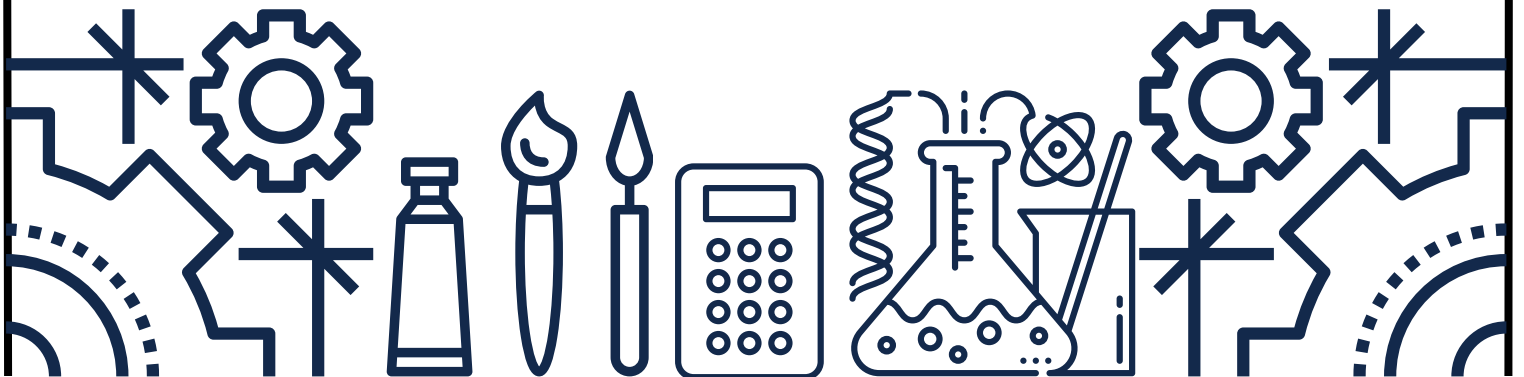
- 1 paper bowl
- 1 individual applesauce cup or 1/2 cup applesauce
- Approximately 1/2 cup of cornstarch
- Spoon or popsicle stick to stir



## Directions:

1. Pour applesauce into the bowl.
2. Add a few spoonfuls of cornstarch and stir carefully.
3. Continue adding cornstarch a little at a time, stirring after each addition. It will become harder to stir.
4. The applesauce should become more solid. Now, it is applesauce ooblek!
5. Touch your applesauce ooblek. Does it feel like a solid? Now try pouring it. Does it pour like a liquid? Enjoy playing with applesauce ooblek.

**Applesauce ooblek is a twist on the classic ooblek. It is a non-Newtonian fluid. It acts like a liquid when it is poured but like a solid when a force is acting on it.**

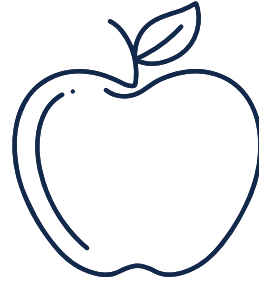


# BALANCING APPLE

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

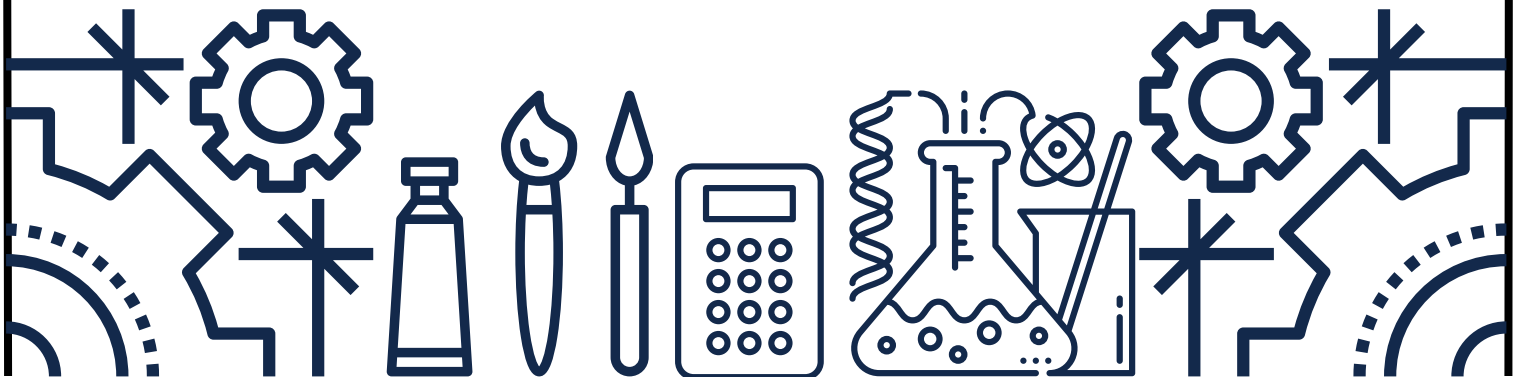
## For this activity you will need:

- Paper plate(s)
- Markers, colored pencils, or crayons
- Scissors
- Clothespins



## Directions:

1. Draw an apple in the center of the paper plate. One with two bumps on the bottom works best.
2. Color the apple the way that you like.
3. Carefully, cut the apple out.
4. Add two clothespins to the bottom of the apple.
5. Put the apple on the tip of an outstretched finger. Will it balance? If not, try moving the clothespins. Can you find the center of gravity for the apple?

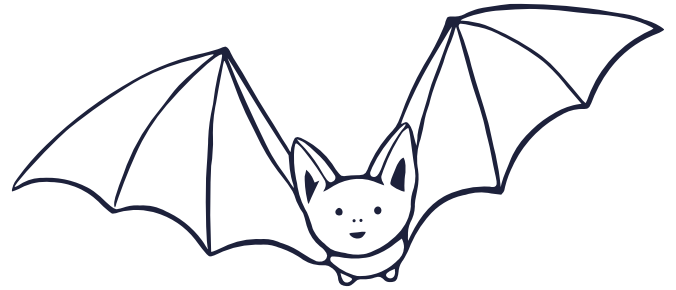


# FLYING BAT CRAFT

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

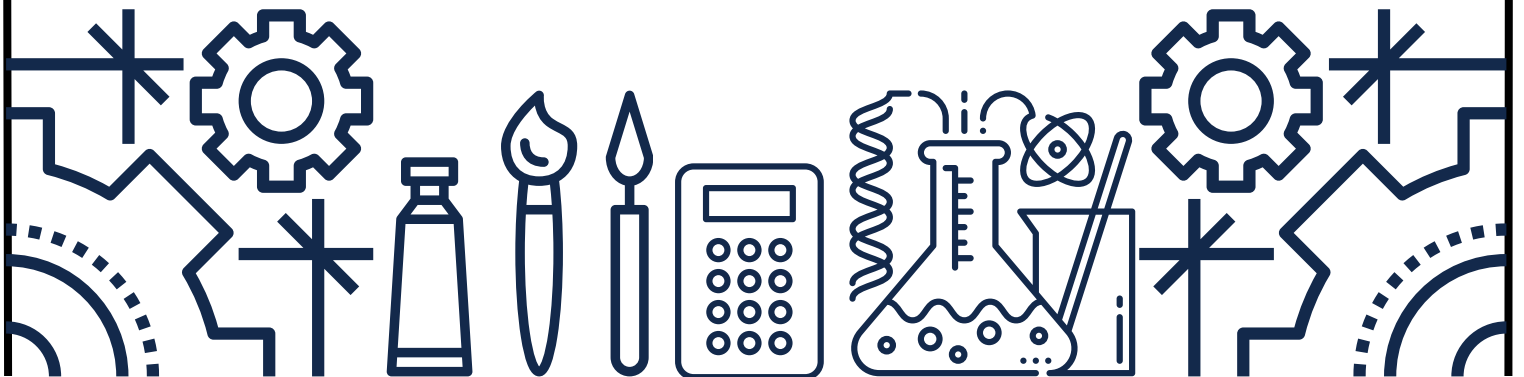
## For this activity you will need:

- Piece of paper or bat template
- Pencil
- Scissors
- Straw
- String or thin yarn
- Tape



## Directions:

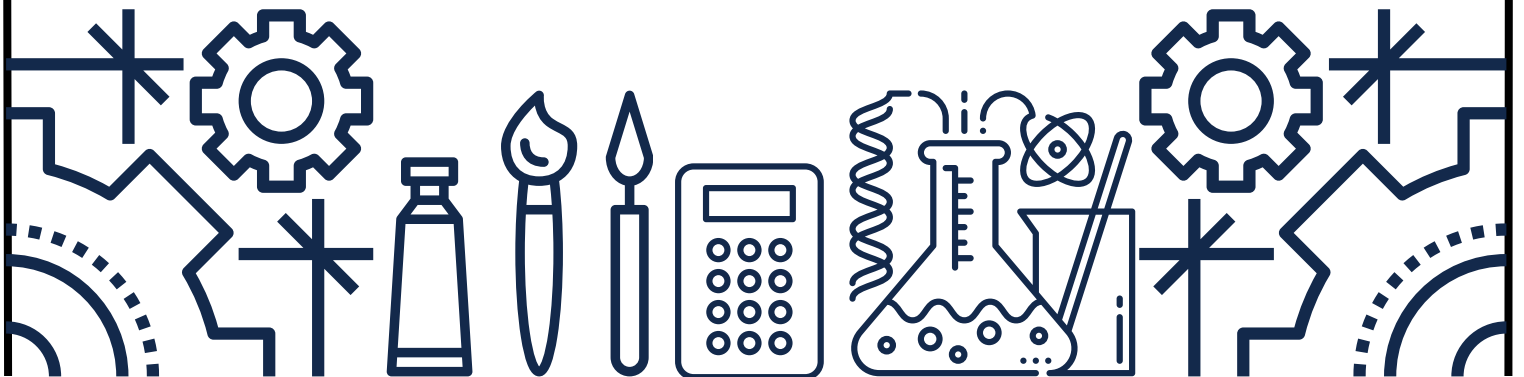
1. Draw a bat on the paper or find a bat template and print it out.
2. Color both sides of the bat.
3. Cut the bat out.
4. Tape a piece of string or thin yarn to each bat wing.
5. Cut the straw in half.
6. Thread each string through the straw.
7. Tape the straw to the bat's body.
8. Pull gently on the strings to make the bat fly.
9. Optional: Fold the bat's head back so that it appears to be flying with its head up.



# FLYING BAT CRAFT

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

Bat template to print

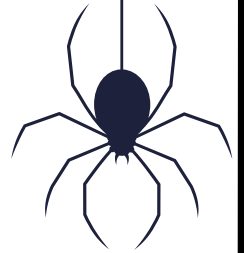


# SPIDER WEB PULLEY

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

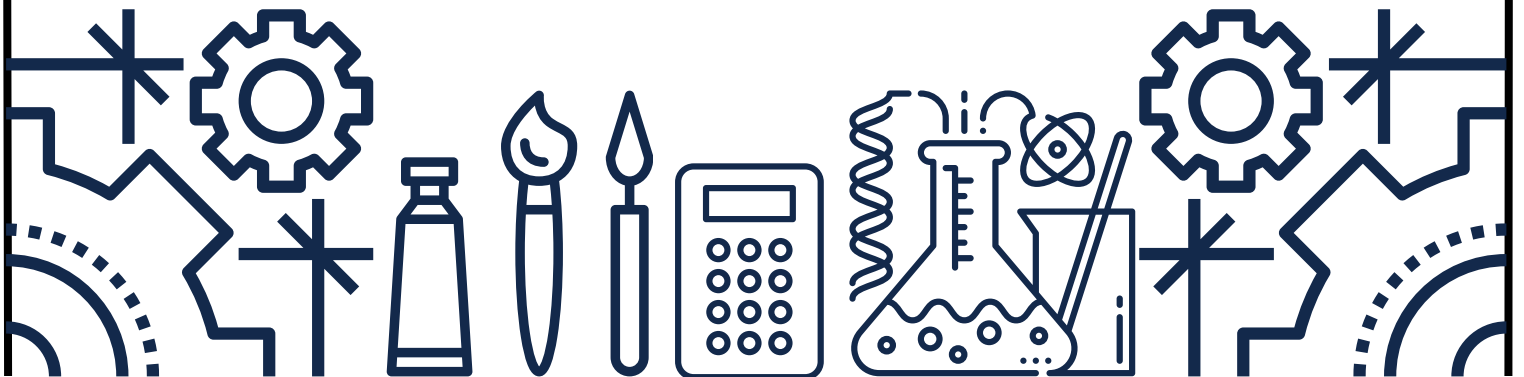
## For this activity you will need:

- Blocks or boxes to build towers (Legos work well)
- Straw
- Spider ring
- Yarn
- Pencil
- Drawing of a spider web



## Directions:

1. Build two matching towers. Leave a gap in the towers for the straw. Be sure that the straw can turn or rotate.
2. Insert the straw through the gap you left.
3. Tape the spider web drawing to the towers so that it spans the gap between the towers.
4. Tie one end of the yarn to the spider ring.
5. Put the yarn over the straw and tie the other end to the pencil.
6. Use the pencil to wind up the yarn to raise and lower the spider.



# APACHE WOVEN BASKET

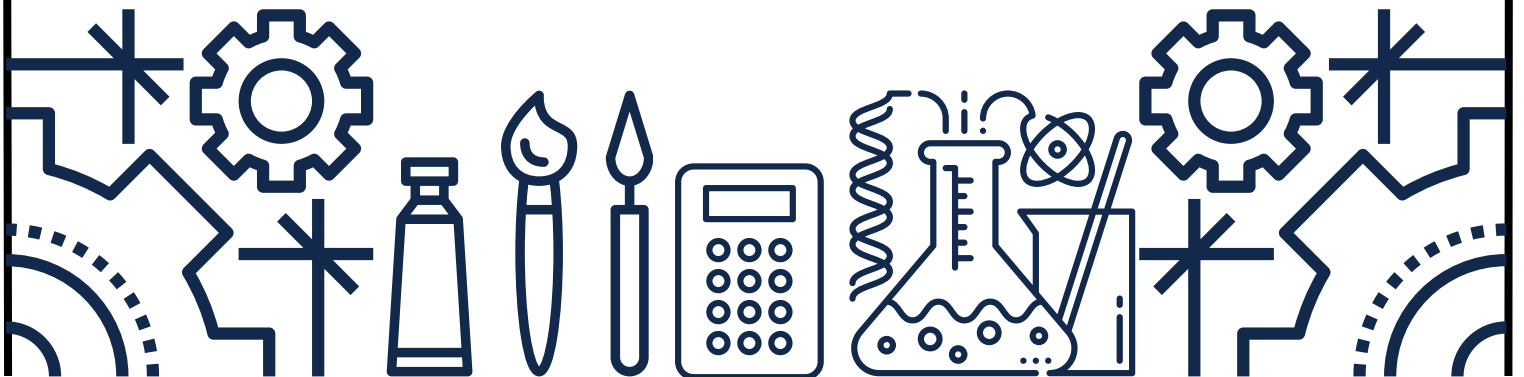
SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Paper bowl or 8-ounce plastic cup
- Scissors
- Yarn, string, or paper cut into thin strips

## Directions:

1. Using scissors, cut from the top of the bowl or cup down to about 1/2 inch from the bottom.
2. Cut more slits in the same way about 2 inches apart around the top of your bowl or cup.
3. To begin weaving, slide the end of your yarn or paper strip into one of the slits and push it down to the bottom. Leave a “tail” hanging out. It will be tucked in later.
4. Work around the container making sure you go over one section and under the next.
5. Once you have completed one whole circle, wrap the yarn around and go back the opposite way. Make sure to go under the sections you went over before.
6. If you would like to change colors, tie the next color of yarn to the first.
7. Keep repeating the weaving steps until you reach the top of your bowl.
8. Tuck ends into your weaving. You have completed your basket.



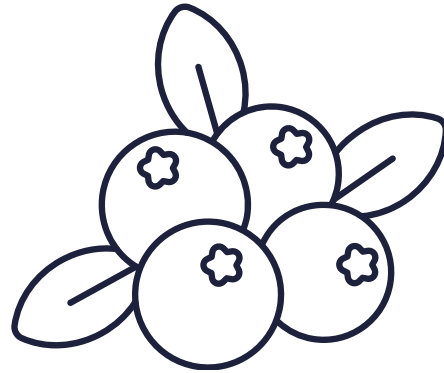


# CRANBERRY HIDDEN MESSAGES

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Whole berry cranberry sauce
- Cranberry juice or water
- Baking soda
- White paper
- Paintbrush
- Cotton swab

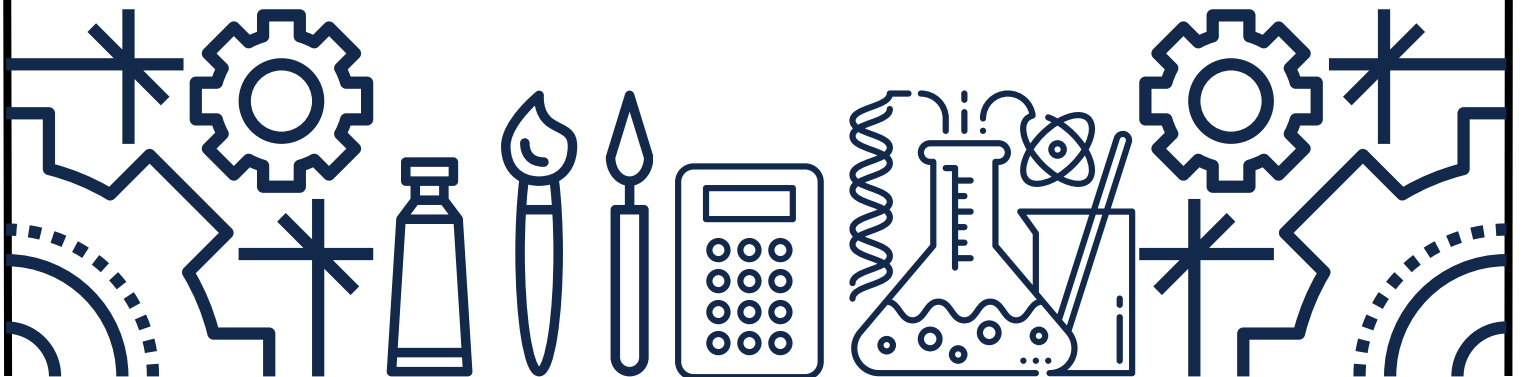


## Directions:

1. Put 1/2 cup cranberry sauce and 2 cups of cranberry juice or water in a pan or microwavable bowl.
2. Heat the mixture, stirring it often. Look for a liquid consistency. Pour the liquid into a bowl and allow to cool.
3. In a separate bowl, mix 4 tablespoons of baking soda with 1/3 cup of hot water. Stir until baking soda is dissolved.
4. With a paintbrush or cotton swab, use the baking soda mixture to paint a mystery message on the white paper. Allow to dry.
5. After the message has dried, take the cranberry liquid and paint over the hidden message to reveal it.

## \*\*What's happening\*\*

The cranberry juice/cranberry sauce liquid is an acid. Specifically, it contains anthocyanin. This reacts with the baking soda mixture which is a base. A chemical change occurs when the anthocyanin reacts to the baking soda. It will turn a bluish-green color. The paper will have a slight red hue from the cranberry juice.



# JACK O' LANTERN OPTICAL ILLUSION

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

## For this activity you will need:

- Index card(s)
- Markers
- Pencil
- Tape



## Directions:

1. Fold the index card in half.
2. Draw and color a pumpkin on one side of the index card.
3. Draw a jack-o'-lantern face on the other side.
4. Put the folded index card over the pencil and tape both sides of the index card shut.
5. Rub the pencil back and forth between your hands to make it spin quickly.
6. Watch what happens. Does the face appear on the pumpkin? What do you notice?

