Spooky STEM Patch Program

Did you know the founder of Girl Scouts, Juliette Gordon Low, was born on Halloween? She had a curious and adventurous spirit and believed girls should dive into science and nature to build confidence and discover new skills.

This patch program honors Juliette by mixing a little spooky season fun with science. Think curious experiments, mysterious nature discoveries, and a dash of Halloween spirit as Girl Scouts explore the world in adventurous ways.

Steps to earn your patch:

- Order your patch (available while supplies last)!
- Complete 4 activities of your choice

Bone Bridge

Bridges are awesome! People have been building them since the very first time someone laid a tree trunk across a stream to get to the other side. Today, bridges help us stay connected by letting us travel over rivers, valleys, and even busy roads.

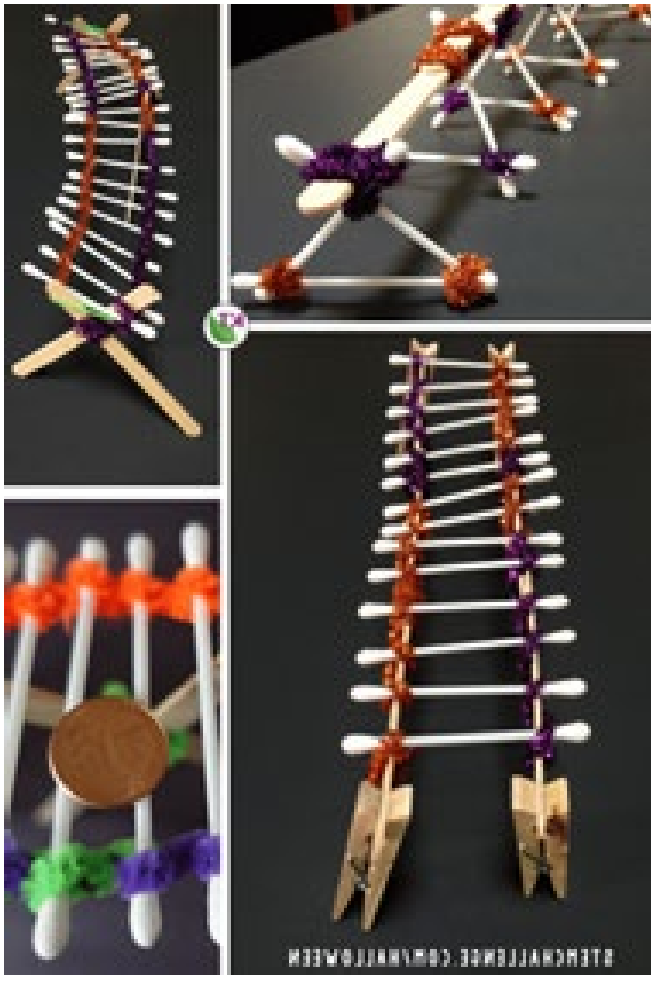
Bridges are also classified by mobility. There are two main categories of mobility. They are fixed bridges and movable bridges. Fixed bridges are anchored in place meaning they do not move. Movable bridges have some type of mechanism that help them move typically to let ships, boats or vehicles pass underneath them. There are 4 types of movable bridges: vertical lift, bascule (or drawbridge), swing, or traverser.Learn more about bridges.

Temporary bridges are another type of bridge that is not permanent. These are normally used when something needs to be built quickly. They are commonly used by the military. Temporary bridges are usually used to move troops, supplies, and military vehicles. Some temporary bridges float directly on the water.

When you build your bone bridge, think about what kind you want to design. Will it be tall and strong? Will it move like a drawbridge? Or will it surprise everyone with something totally unique?

Materials

- Cotton swabs
- Pipe cleaners
- Tape
- Clothespins
- Ruler
- Candy bar (for testing)
- Video instructions (optional)



Goal

Using only the listed materials, make a bone bridge that is at least one foot long and one inch off the ground/table that holds a candy bar.

Pumpkin Lava Lamp

Making your own fa-boo-lous pumpkin lava lamp is so much fun, but the science behind it is super cool too!

Oil and water do not mix! Water is a polar molecule, which means one end has a slight negative charge, and one end has a slight positive charge. Water molecules stick together because the positive ends connect with the negative ends and vice-versa. Oils are non-polar molecules which means they lack positive and negative ends. These are necessary to form strong attractions to water molecules.

Another physical property water and oil have that keeps them from attracting is density. Oil is less dense than water. When oil and water are combined, oil's lower density causes it to float on top of the water.

Lava lamps are made of a special wax mixture (typically a bright color) contained in glass. Glass is used because the light required for a lava lamp would get too hot and melt plastic. The liquid inside a lava lamp is water or another liquid that is like water. The lava rises after heat from the light bulb has heated the lamp enough for the 'lava' to warm and expand.

Our pumpkin lava lamps will not need heat, so we are going to use plastic. They can be shaken around or Alka seltzer can be added to make your pumpkin lava lamp move. The Alka seltzer works because it reacts to the water in the lava lamp to make carbon dioxide gas and sodium citrate which are way less dense than water and oil, so they rise to the top of the bottle.

Materials

- Clear plastic bottle or jar
- Orange food coloring
- Water
- Black marker
- Vegetable oil
- Glitter (optional)
- Alka Seltzer
- Green pipe cleaners to decorate

Goals

Learn that water and oil do not mix, which is a part of how we get our groovy pumpkin lava lamp to work.

Instructions

1. Fill a bottle or a jar a quarter full of water and add food coloring to the bottle. Put the lid on and mix the water and food coloring up. Add glitter if wanted.
2. Remove the lid and finish filling to near the top of the bottle with oil.
3. Put the lid on to decorate or add a pipe cleaner for a stem, or draw a face and make a jack-o-lantern.
4. Drop in the Alka seltzer tablet to make your pumpkin lava lamp dance.
5. Watch the bubbles go!

Flying Tea Bag Ghosts

(Adult Supervision Required)

Get ready for a spooky-cool science experiment that will captivate girls and teach them about density and convection! The Flying Ghosts Science Experiment, provided by STEAM Powered Family, is perfect for Halloween—or any time of year—as part of a hands-on thermodynamics lesson. Quick, simple, and endlessly fun, this flying tea bag activity will have kids amazed and asking to do it again and again. It looks like magic, but it's pure science: heat in action makes ghost after ghost soar into the air, showing just how fascinating physics can be!

Materials

- Tea bags (type with tags that fold over: Twinings and Stash brand word best)
- Scissors
- Markers
- Lighter
- Baking Sheet/heat proof surface
- Water/fire extinguisher
- Video instructions (optional)

Goals

Make your own ghost fly and learn why it flies.

Instructions

1. **SAFETY FIRST:** Whenever working with any fire in a science experiment you need to ensure you have proper adult supervision, a safe, fire proof work area, and a fire extinguisher.
2. Cut off the string holding the tag of the tea bag. Open the tea bag and empty all the tea into a bowl. Feel free to reuse the tea in a bath bomb, homemade soap, for tea with a tea diffuser or put it in a garden to compost.
3. Smooth out the tea bag to draw a ghost face on the tea bag. Make sure the tea bag is placed on a surface protector, so the sharpie/marker doesn't bleed through.
4. After drawing the face carefully open the tea bag and stand it up on a baking sheet.
5. When ready light it with a lighter and watch it fly.

CAUTION: Ghosts have been known to launch 5 to 6 feet into the air. Ensure you have plenty of ceiling clearance.

Special Note: If your ghost doesn't fly, you might be using a thinner tea bag. Twinings, Stash, and Tazo tea bags are typically thicker and work better.

Glowing Tonic Water

Are you captivated by things that glow in the dark? Imagine watching a drink light up like magic right before your eyes! With just a few simple ingredients you probably already have at home, you can make tonic water glow brilliantly under a black light. In this exciting experiment, you'll mix chemicals together and then shine a black light to reveal a dazzling, otherworldly glow. It's like creating your very own glowing potion—and the best part? You get to see science come alive in a way that feels pure magic!

Materials

- Tonic water
- Clear plastic cup (disposable)
- Medicine dropper
- Bleach
- Black light
- Measuring cup (optional)

Goals

Find out what happens to the glowing toxic water when other chemicals are added.

Instructions

1. Pour one cup of tonic water into a clear disposable cup.
2. In a dark room turn on the black light and look at the cup – observe what you see.
3. Use a medicine dropper to carefully add two drops of bleach to the tonic water, gently mix.
4. If there is no change add a few more drops of bleach.
5. In the dark room with the black light, observe what the bleach did to the tonic water.
6. Look at the bottle of tonic water compared to the bleach and tonic water in the black light and observe the differences.

Candy Corn Catapults

Get ready to design and build your very own mini catapult and see how far you can launch objects—then challenge your friends to beat your distance! A catapult is essentially a lever, and in this case, your plastic spoon acts as the stick, balanced on a pivot point called a fulcrum. The closer the spoon is to the fulcrum, the more it can magnify the force and send your projectile flying farther.

When you launch your object, you're turning stored elastic potential energy, from bending or stretching the spoon, into kinetic energy, which makes the object soar through the air. This hands-on experiment is a fun way to explore the physics of levers, energy transfer, and motion, all while competing with friends to see whose mini catapult reigns supreme!

Materials

- Popsicle sticks
- Pencils
- Rubber bands
- Regular sticks
- Tape
- Plastic spoons
- Candy corn
- Catapult designs

Goals

Find the design of catapult that goes the farthest and figure out why.

Instructions

1. Explore different types of catapult designs.
2. Build different types of catapults and see which design can fling candy corn the furthest.

Homemade Paint

Did you know that Juliette Gordon Low, the founder of Girl Scouts, loved to paint? Now it's your turn! In this activity, you'll mix your own homemade paint using ingredients from your kitchen and create a fun, spooky still life. Think pumpkins, spiders, and your own creative flair!

Materials

- Measuring cups
- 2 cups water
- 2 cups salt
- 2 cups flour
- Food coloring (optional: make only orange and black for a Halloween theme)
- Paint brushes
- Thick paper
- Mixing bowl
- Small bowls (one for each color you want to make)
- Fake pumpkins and spiders

Goals

Experience a creative activity that Juliette Gordon Low enjoyed over 100 years ago and create your own still life painting.

Instructions

1. In a large bowl, mix water, salt, and flour until smooth.
2. Divide the mixture into small bowls—one for each color you want.
3. Add food coloring to each bowl and stir well to create your paints.
4. Arrange pumpkins and spiders on your thick paper however you like.
5. Grab your brushes and start painting! Watch your homemade paints bring your spooky scene to life.

Exploding Ghost Peeps

Did you know that Peeps are just marshmallows in disguise? Marshmallows are made of sugar, water, and tiny air bubbles. The water molecules are so small you can't see them individually, they just look like liquid to your eyes.

When you microwave a Peep, the water molecules start to move and vibrate, which heats up the sugar. As the sugar warms, the air bubbles inside the marshmallow begin to move faster, pushing against the walls of the Peep. The sugar softens, making the marshmallow stretchy, and the bubbles expand even more, which is what makes your Peep puff up and grow right before your eyes!

It's a fun, tasty way to see science in action and explore heat, molecules, and air pressure, all from a little marshmallow treat.

Materials

- Ghost peeps (or any kind)
- Microwave
- Microwaveable plastic bottle or plate
- Scissors

Goals

Know that molecules are too small to see with eyes. Learn that the heat from the microwave is what makes the peeps get larger and explode.

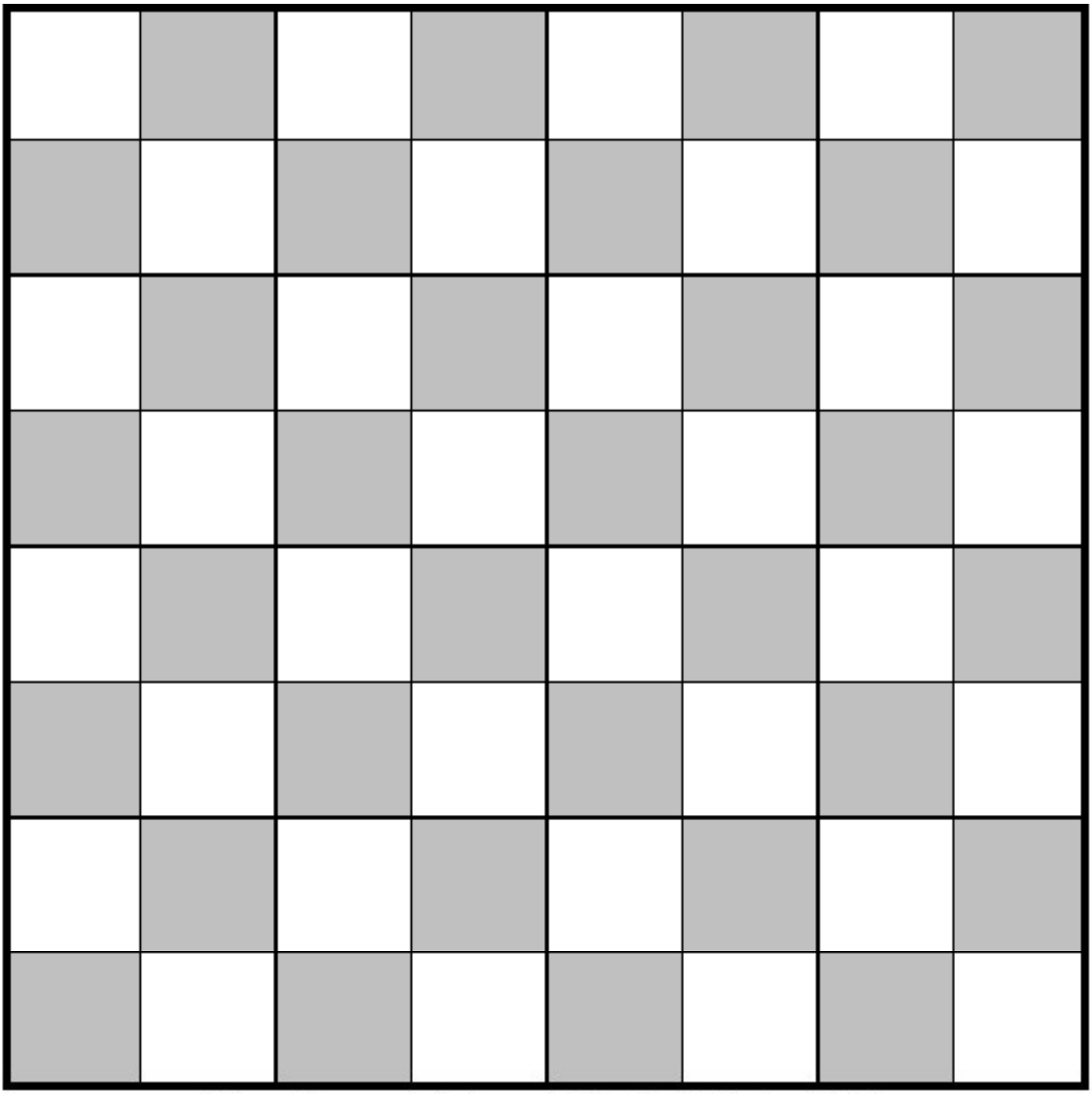
Instructions

1. Place ghost peeps on a plate or in plastic bottle.
2. Put the plate/bottle in the microwave and set to low or medium power for 25 - 30 seconds.
3. Observe what happens.
4. If you have extra ghost peeps, you can try different times and see if you can make the ghost peep larger, but don't let your peep collapse! Like any bubble, if the peep expands too much the air bubbles will burst and the peep will collapse on itself.

EIGHT BATS

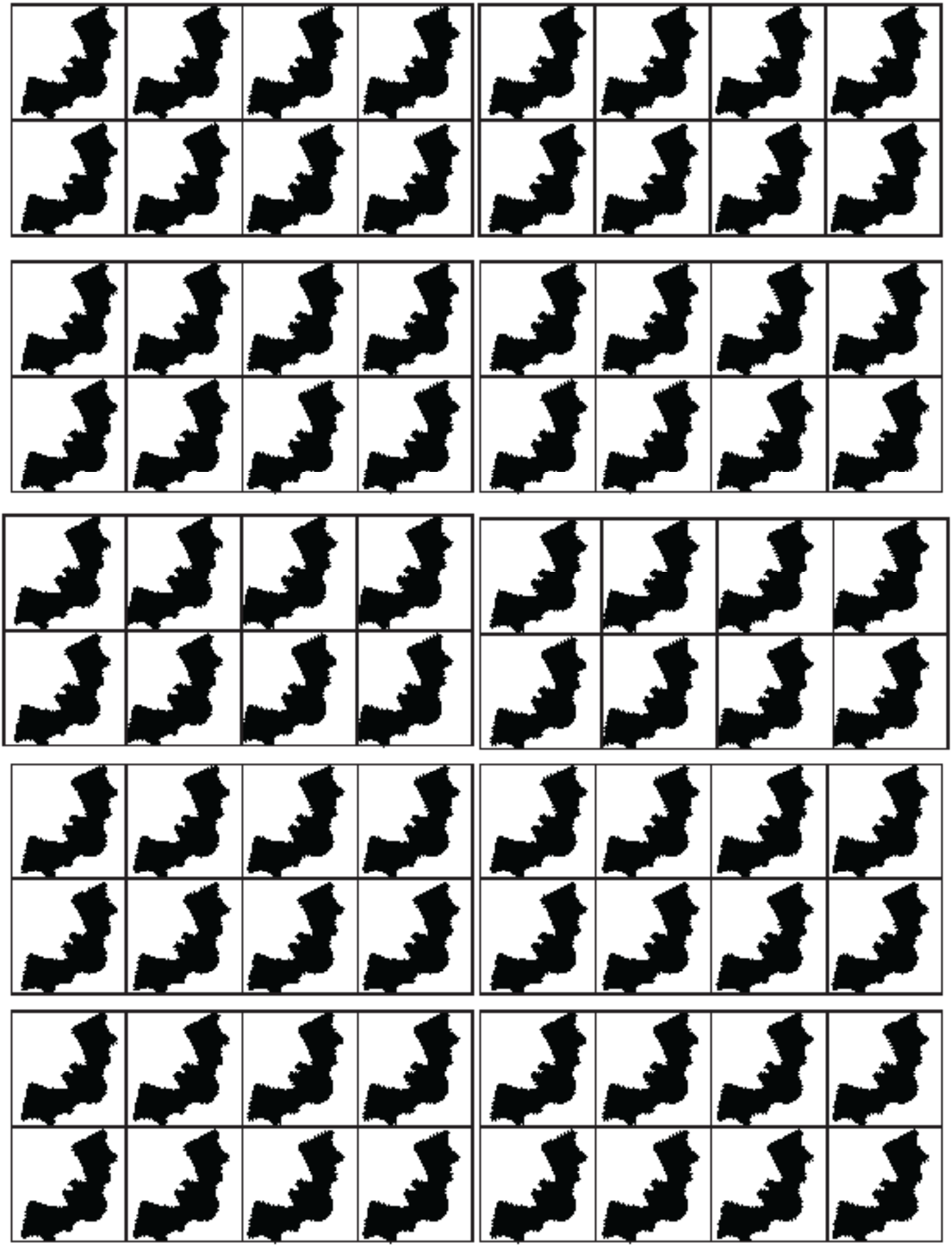
A HALLOWEEN PUZZLE

Place eight bats on the checkerboard below so that no two bats are on the same line, either vertically, horizontally, or diagonally.



This is a variation on a classic chess puzzle first published by Max Bezzel in 1848.

Puzzle Formatted by Sarah Carter | @mathequalslove | mathequalslove.net | M + A + T + H = love



9 PUMPKINS PUZZLE

Without lifting your pencil, draw 4 straight lines that pass through all nine of the pumpkins.