LAB

Tested, edited & approved by:

Sarah Springer, Aurora High School Senior

Balancing Man Center of Gravity

TIME:

30-40 Minutes

GATHER THIS:

- Jumbo Craft Stick
- Pipe Cleaner
- 2 Clipping Clothespins
- Permanent Markers
- Googly eyes
- Cool temperature glue gun
- Have a completed project on hand for demonstration purposes.

THEN DO THIS:

1. Start by having the kids decorate the craft stick with markers to create a character of their choice. (brainstorm ideas before beginning - these could even be animals 😉)

Color the bottom 1/3 of the stick a solid color for the pants.
The pipe cleaner will become the character's legs, so there is no need to draw those on
Then draw on a shirt and face.
For the shirt you can draw on arms, this is the easiest version.
Or use a small piece of pipe cleaner to make arms later.
Draw a face. If wanted you can even glue on tiny googly eyes.

2. Once the craft stick is decorated, it's time to turn it into a balancing person toy.

Start by bending your pipe cleaner in half to find its center.
Then open it back up.
Wrap the middle portion of the pipe cleaner around your craft stick, approximately 1 inch from the end of the craft stick.
Twist it tightly so it stays on.
It's important that you leave an even amount of pipe cleaner on both sides of the craft stick when you are finished. If needed,

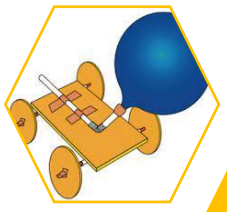
you can use scissors to trim off any extra that may happen on one side. A cool temperature glue gun can help secure the pipe cleaner.
Once the pipe cleaner is attached, clip a clothespin to each end.
Now try to balance your craft stick person. Some trial and error and adjustments may be in order–that's part of being a scientist!
Place its end on your finger tip, or someone else's fingertip.
It may take you a few minutes to get the stick person to balance. You may have to slide the pipe cleaner closer to the end of the craft stick or bend the pipe cleaner legs some to get it to work.

TALK ABOUT THIS:

Talk about center of gravity . Give each student a craft stick and try to balance it on the table or on their finger…it doesn't work well. Then show how by lowering the center of gravity with a pipe cleaner and clothespins, it will then balance on your finger. Show a completed project. It's pretty cool!

The Science behind a balancing toy:
You are able to balance the craft stick on its end because you changed its center of gravity. In simple terms, the center of gravity is the point where the weight of an object is even on all sides.
Originally the center of gravity is located in the middle of the craft stick.
Adding the long pipe cleaner legs and clothespins towards the bottom and letting them

hang down lowers the stick's center of gravity. This allows you to balance the stick on its end. It's not magic---IT'S SCIENCE



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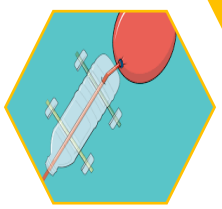

Engineering a Balloon Powered Car

TIME:

45+ Minutes

https://www.youtube.com/shorts/w10Yf3eZEaM?feature=share (video link)

Science Link - Newton's Law of Motion put into action

GATHER THIS:

- Cheap full-sized paper plates 1-2/student or a piece of pre-cut cardboard about 4" x 4"
- Scissors
- Balloons 1/student
- Bottle caps for wheels – 4/student (center hole pre-drilled in each cap)

https://m.media-ama (click link to view plastic caps here)

- Bendy Straws 1/student
- Regular straws 2/student for axles.
- Rubber Bands to attach the balloon to the straw
- 2 skewers for axels for each student
- Hot glue guns to seal wheels onto the axle
- Masking Tape
- Markers to personalize cars
- Orange Cones for starting line and finish line
- A completed car you made ahead of time

THEN DO THIS:

Challenge – to build a car with given materials that rolls and travels forward- hopefully in a straight line. Students have a paper plate and items to make the wheels and axles. They must also determine a way to attach the blown-up balloon. When the balloon is released the car will zoom forward.

The promise of races with other teams makes them work really hard!

Start with a discussion about all the different ways that the vehicles we have can "move." Gas powered, electric, solar, etc. Share that today the kids will be engineering a car that runs on AIR!

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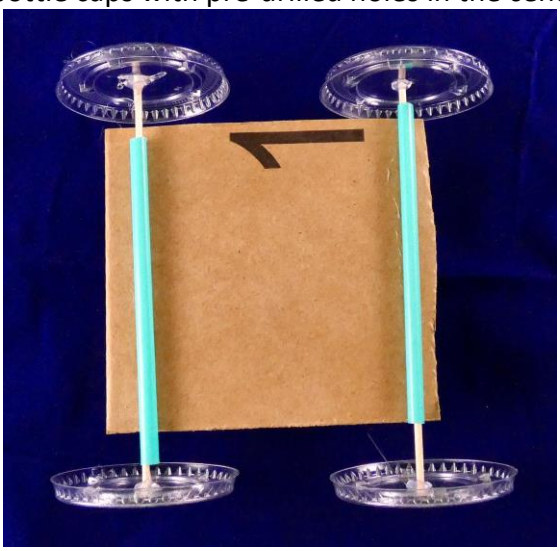
Shawna Vinkenberg, Edgerton Afterschool Coordinator

Show kids your finished car and demonstrate how you made it.
Share the materials they will be able to use to design their air powered car.
On a white board, list the following parts their car will need:
Body (from a paper plate - it can be cone shaped, rolled like a hotdog, flat, etc.
4 wheels from plastic bottle caps with pre-drilled holes in the center for the axles



Axle made from a straw and a skewer through the middle. Attach the axle to the wheels with hot glue. Make sure the axles are glued in the center of each wheel.

Balloon attached to a straw with a rubber band that is then attached to their car to make it GO!

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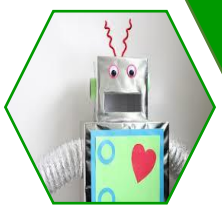
They may be as creative as they wish.
Younger students will need assistance with gluing.
Encourage kids to give their completed car a trial run and then have them make adjustments as needed.
The emphasis of this activity is on design thinking, revising, and using science and engineering practices.

LAB



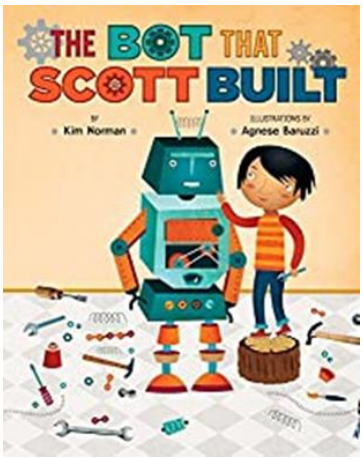
Engineering a Robot

TIME:

45+ Minutes

GATHER THIS:

- Pipe cleaners
- Styrofoam cups
- Craft sticks
- Scrap Paper
- Poms
- foil
- Straws
- Wiggly eyes
- Cardboard tubes
- Beads
- Scissors
- Glue
- Glue guns
- Tape
- Literature Link - THE BOT THAT SCOTT BUILT by Kim Norman



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THEN DO THIS:

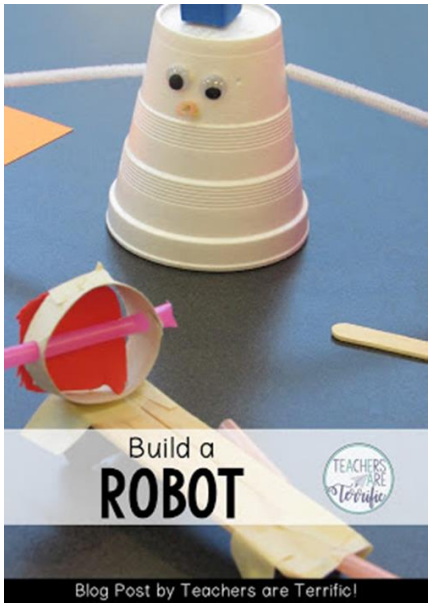
Introduce the activity by having the kids brainstorm ways robots help us in our world.
Read the book, “The Bot that Scott Built” to help the kids focus on what job Scott’s robot had. (And enjoy the humor and unpredictability of the story!)
Challenge for the kids:

CHALLENGE FOR THE KIDS:

To create a one-of-a-kind robot using everyday items.
Two things their Robot must have when it is completed:

1. A name
2. A job/purpose

Share a completed robot that you have made with the kids.
Show them each of the supplies that you chose to you and they may use. They do not need to use all the supplies
Show them the glue, tape they have to work with.
Brainstorm what they could use for the robot’s body, arms, eyes, etc. The sky is definitely the limit on this open ended activity!
Set a time limit for them to work.
When they are finished with their robot, have them show you/others. Have them share the robot’s name and purpose. Celebrate ALL creativity and cleverness!! The process is more important than the final product.



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Engineering Air Powered Rockets

TIME:

20-30 Minutes

GATHER THIS:

- Rocket templates (click for template) additional rocket templates at the end of the lesson.
- Scissors
- Tape
- 2 straws – one thinner than the other
- Markers
- Glue sticks

THEN DO THIS:

1. Cut out 2 of the same rockets, color and design.

2. Have each student put their name on their rocket so it can be returned after it is launched.
3. Cut a thin straw down to 4 inches in length and tape the top of it shut.

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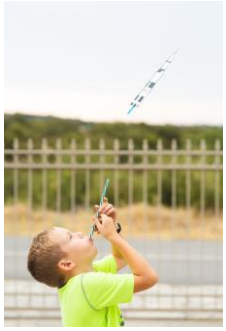
4. Tape the thin straw to the wrong side of one rocket piece. Leave about 1.5 inches of straw sticking out of the bottom of the rocket, and stop the tape 1/2-inch from the edge of the rocket, as pictured.

5. Tape or glue the edges of the rockets together, leaving the bottom edge open

6. Slip the thicker straw over the thinner straw end that is sticking out of the rocket.

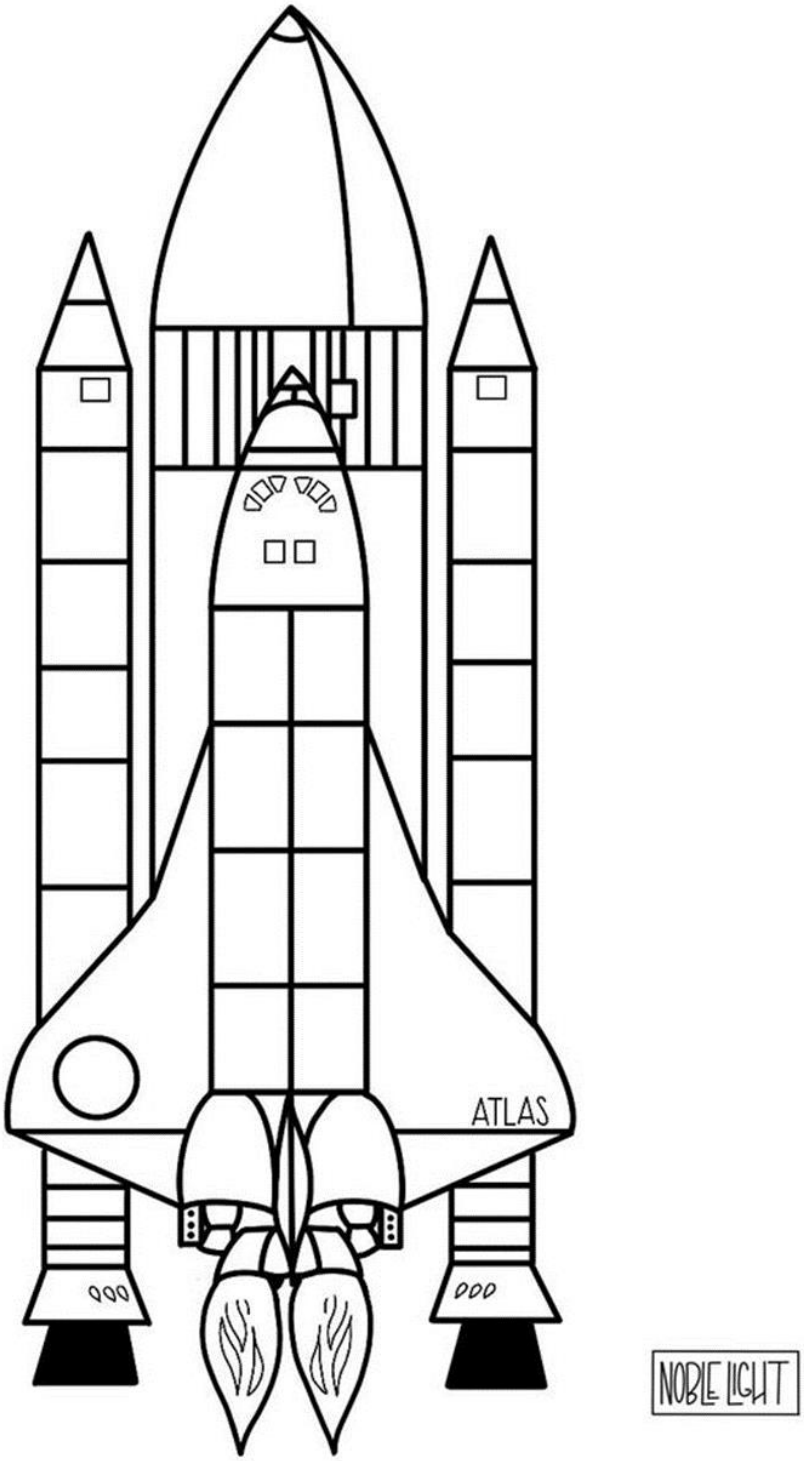
An outdoor, open space can be used for a rocket launching site. Count backwards from 10 and then have the kids use 'air power' to blow into their straw and "blast off" their rockets. Retrieve and retest. Have fun!



Helpful Hint: There is a little trick to getting it go high -do not push the straw very hard into the rocket. Place it loosely on top. Then when you blow, give it one fast blow to make it fly sky high!

TALK ABOUT THIS:

Talk about the force of air. When you blow into the straw, the big puff of air gets stopped at the top and pushes back down. The force pushing it back down causes the rocket to fly! This is Newton's third law of motion- action and reaction!



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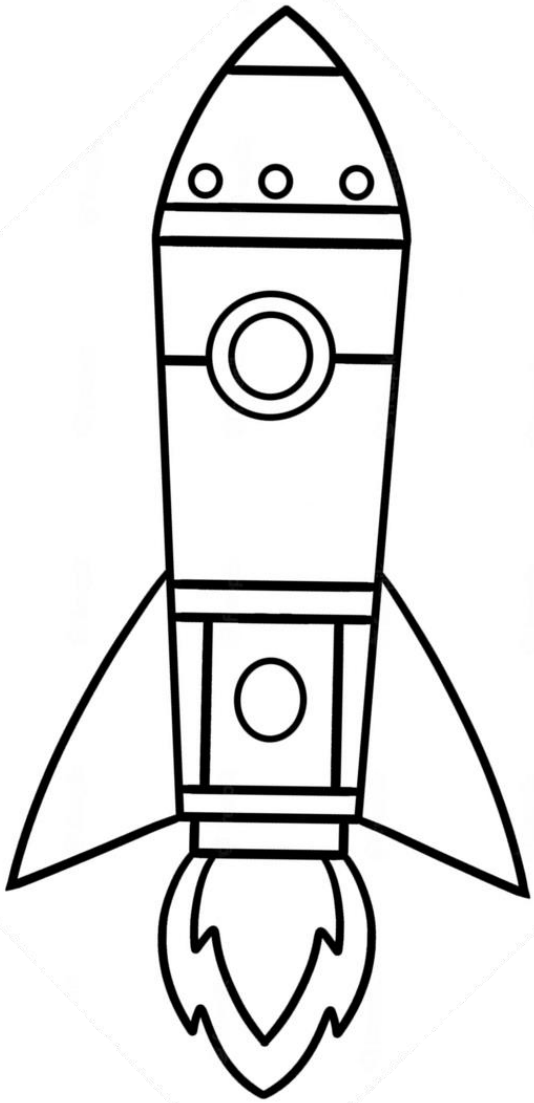

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LAB

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Sarah Springer, Aurora High School Senior

Engineering Popsicle Stick Catapults

TIME:

15-20 Minutes

GATHER THIS:

- Craft sticks
- Spoons
- Rubber bands
- Foil (makes great ammo)

THEN DO THIS:

1. Take 5 sticks and stack them, securing one end with a rubber band. You'll need to wrap the rubber band around several times to make it nice and secure.

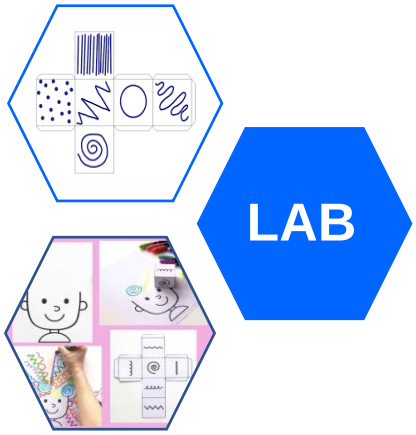
2. Slide one more stick between the bottom stick and the rest of the stack.

3. Secure the other end with a rubber band.
4. Place the spoon on top, and attach the end of the spoon to the end of the single stick with the last rubber band

5. Crumpled balls of foil and small marshmallows make excellent projectiles for this style of catapult.

Options:

- Add in an art component and have kids use markers to decorate their catapults.
- Set up targets (buckets, sheets of cardboard) and see if they can hit the target.
- See who's catapult can launch a projectile the farthest. Use a measuring tape to find out.



Line Art w/ Homemade Dice

Tested, edited & approved by:

Sarah Springer, Aurora High School Senior

TIME:

30-40 Minutes

GATHER THIS:

- Dice pattern for each student (templates below)
- Preprinted faces (templates below)
- Markers
- Scissors
- tape/glue sticks

THEN DO THIS:

1. Photocopy dice patterns and face patterns and have on hand.
2. Kids will fold and glue/tape their dice together. Demonstrate this process. Young children will need assistance with accurate cutting and folding.
3. Demonstrate how each side of the dice represents a different type of line. When they roll a specific line, they may add that line to their "face page" to create a Wacky hair day artistic masterpiece.
4. Encourage kids to use different colors for each line and to make their portrait interesting and fun!
5. Kids may display and share their final products upon completion.

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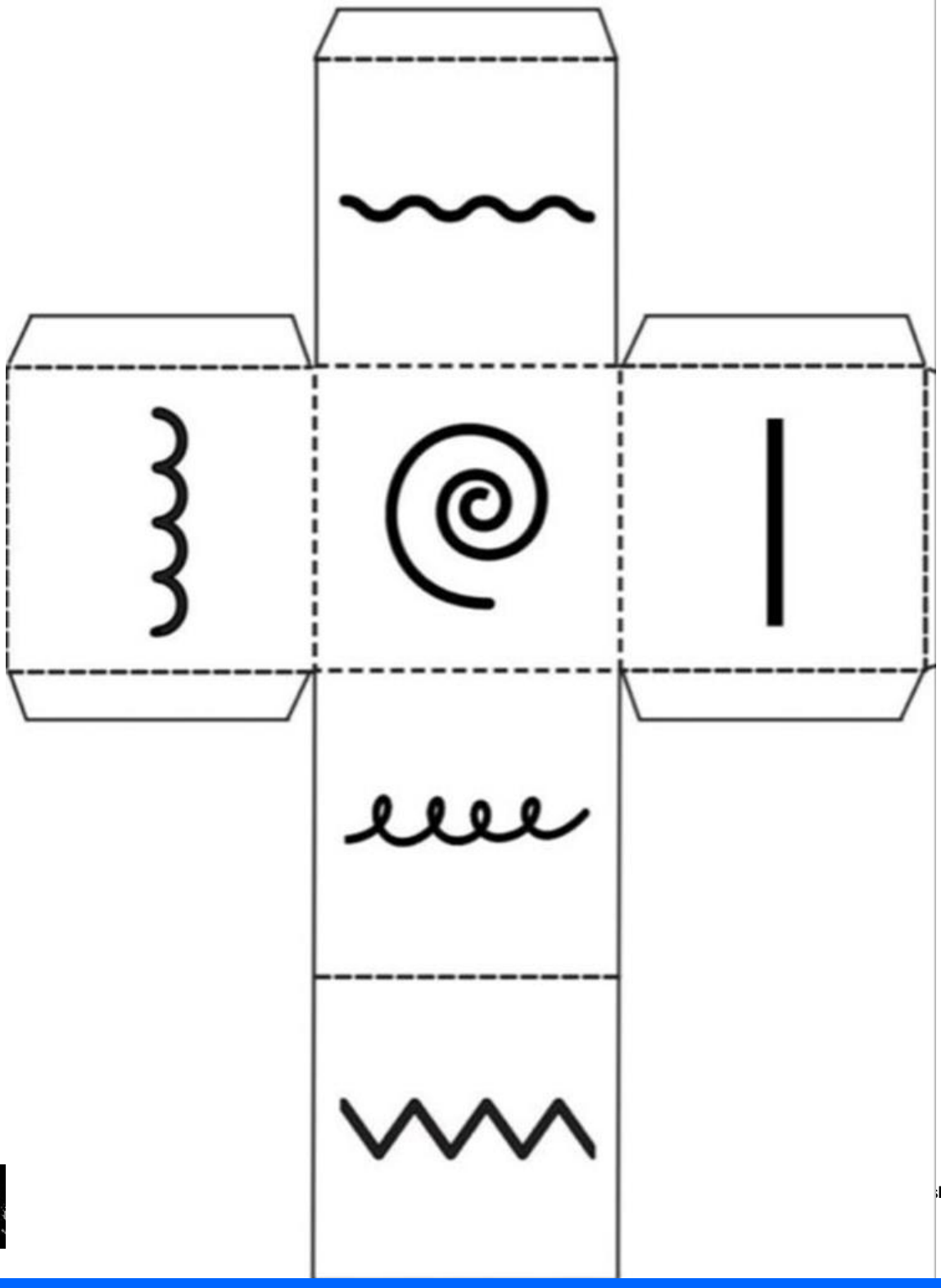

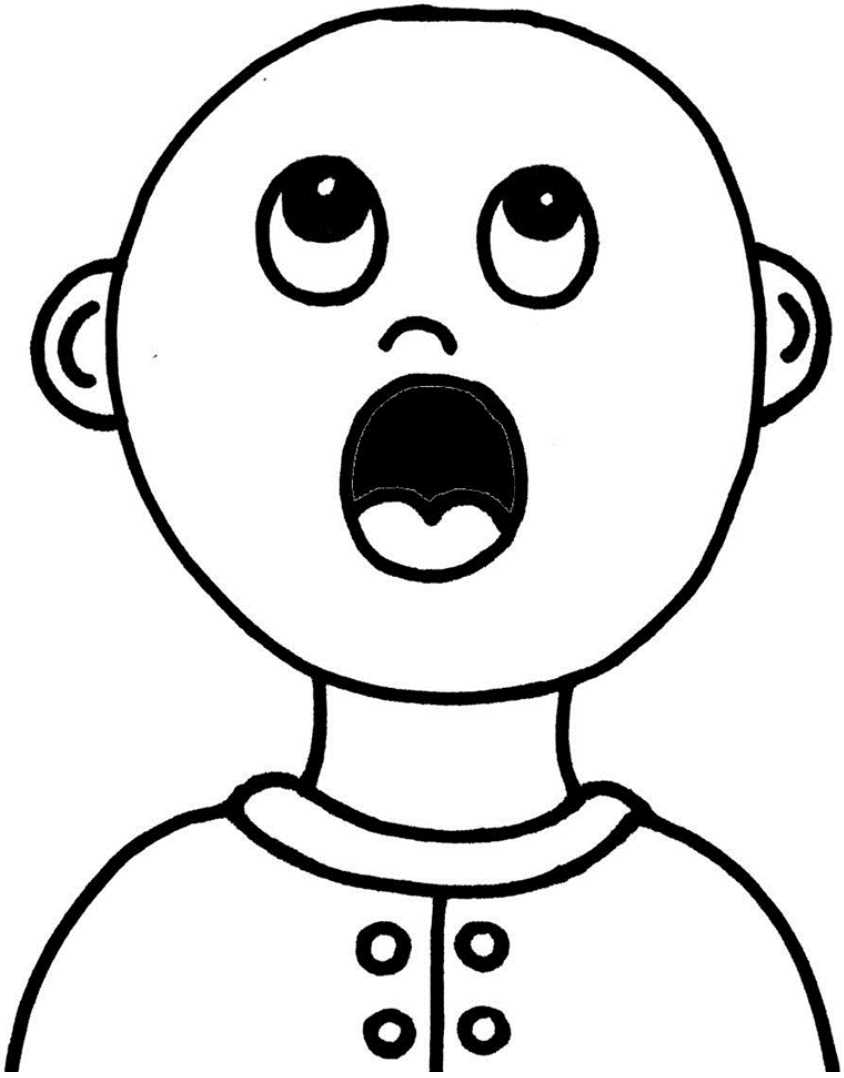

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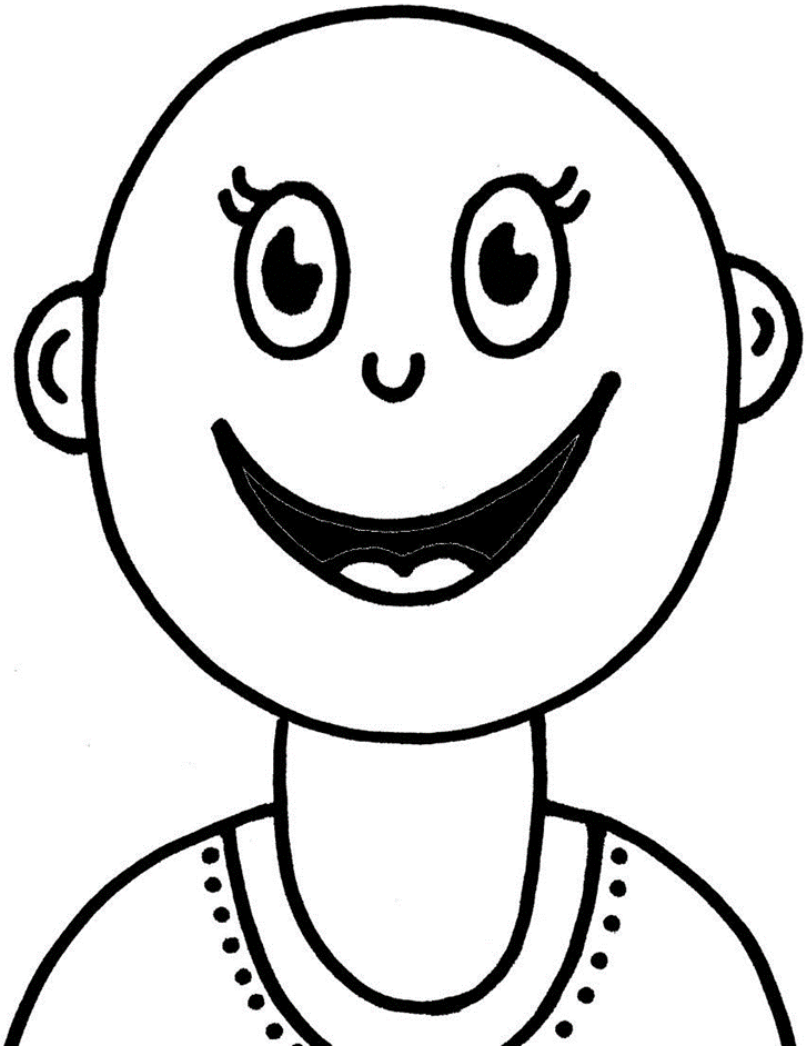

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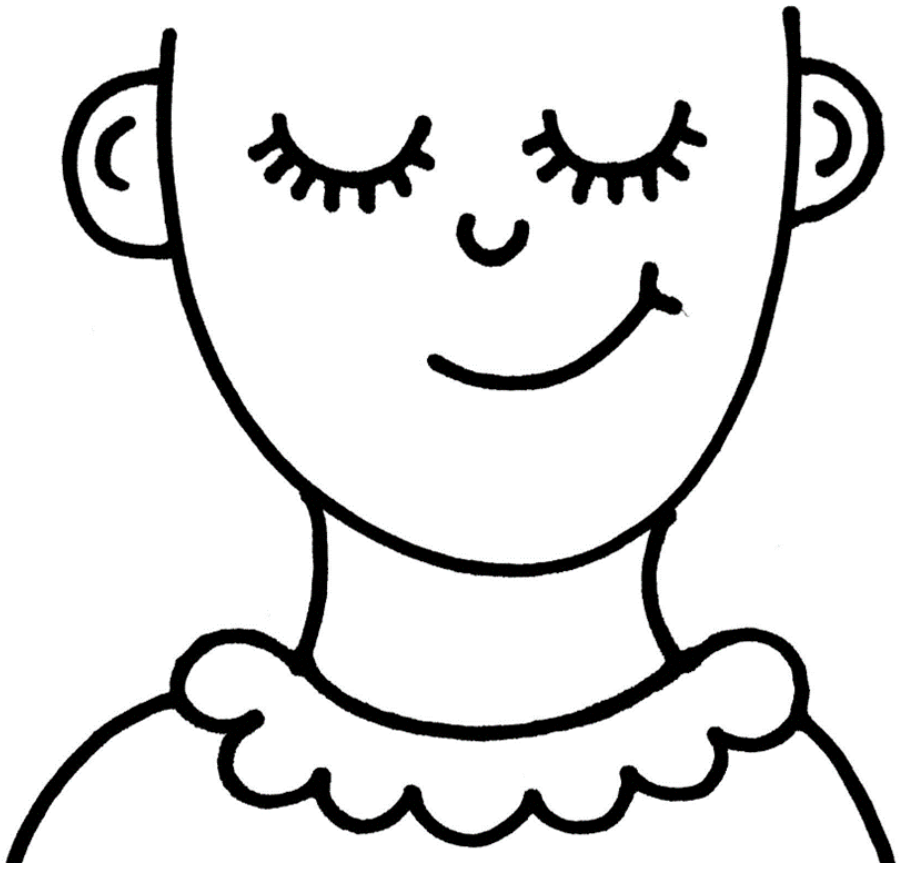

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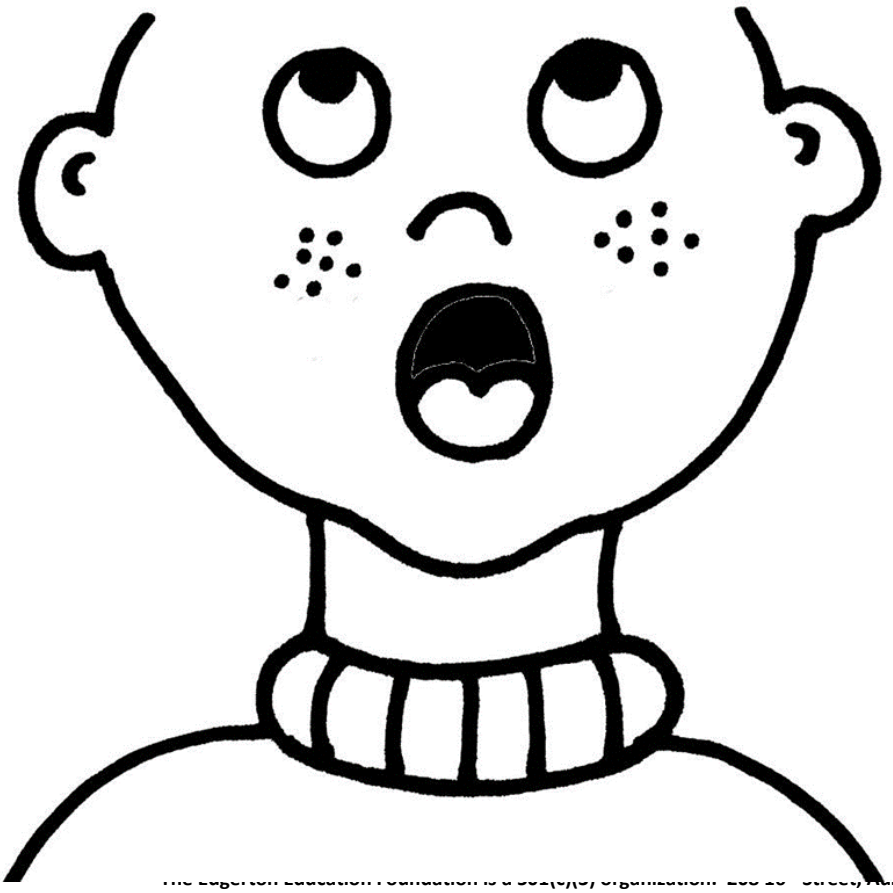

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LAB

Melting Plastic Sun Catchers or Ornaments

Tested, edited & approved by:

Shawna Vinkenberg, Edgerton Afterschool Coordinator

TIME:

20-30 Minutes

GATHER THIS:

- permanent markers – Like sharpie markers
- Clear Plastic Cup (recycle #6 ONLY) 5 or 9 oz sizes work great - Other cups WILL NOT MELT correctly
- hole punch
- Scissors
- string for hanging
- cookie sheets
- Foil to cover cookie sheets
- oven preheated to 400 degrees

THEN DO THIS:

- Cover table surfaces to protect from permanent markers.
- Draw with permanent markers on plastic cups. (Encourage creativity!) The more color the better.
- Hole punch the cup in one place around the rim – you will not be able to punch a hole in them once they melt.
- Place on cookie sheet covered with foil and put in preheated oven (400 degrees) You may want to do a trial run in your oven beforehand as all ovens are a bit different
- Turn the oven light on and watch until the cup shrinks down to a flat circle. Note that only the suncatcher in the middle of the cookie sheet will be completely flat. A pancake flipper can be used to help flatten each suncatcher once they come out of the oven.
- Allow to cool a few minutes before having the kids pick up and handle.
- Thread a string through the hole and hang in a window or on a tree outside.

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Model Magic Create-ures

TIME:

35-45 Minutes

GATHER THIS:

- Crayola Model Magic

Possible Materials For Students/Groups to Use (you can use whatever you have available though!)

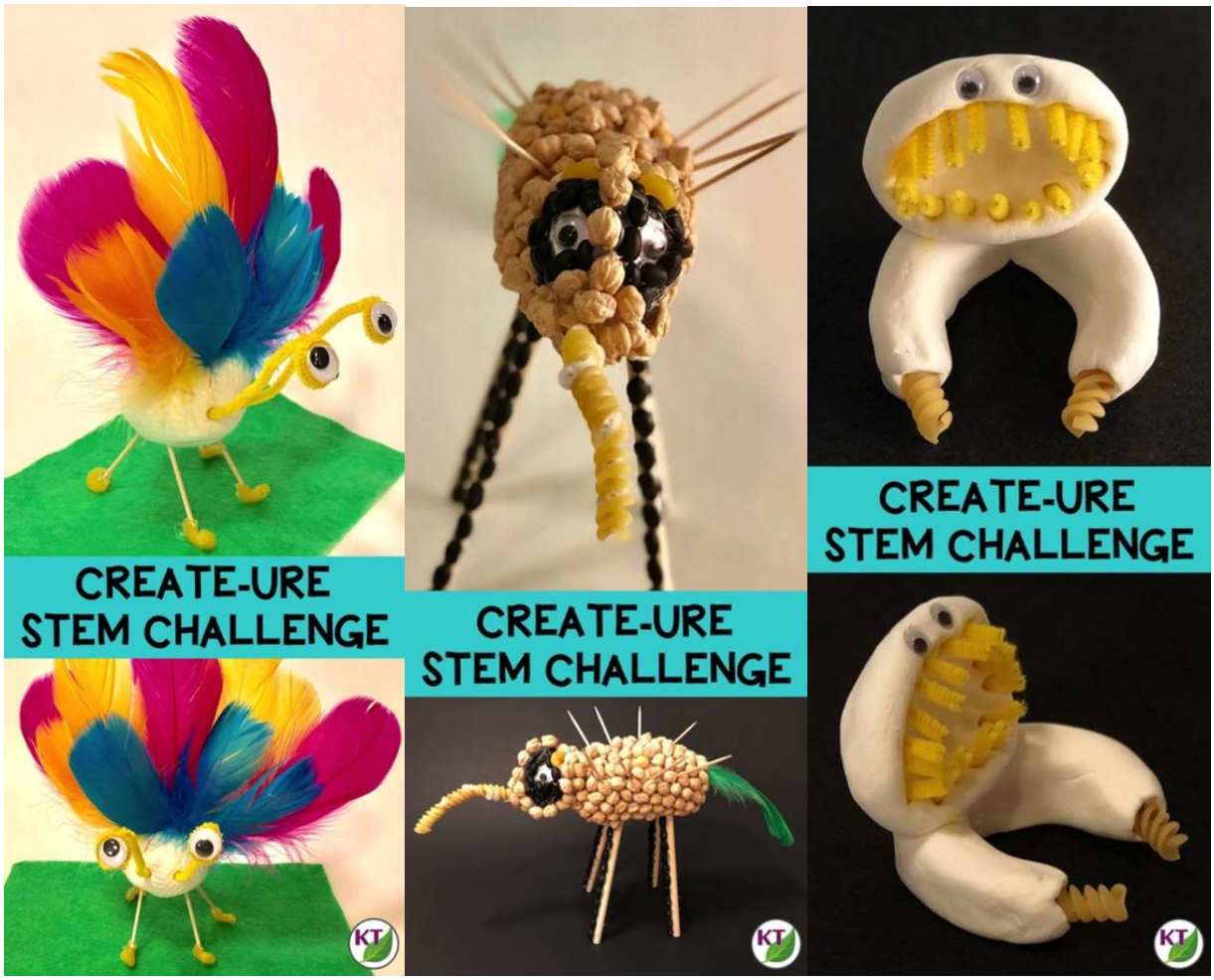
- Newspaper, tissue paper, Construction paper
- Craft sticks
- Pipe cleaners
- Sequins
- Yarn
- Pom poms
- Googly eyes
- Feathers
- Toothpicks
- Scissors
- Foil
- Cotton
- Glue
- Masking tape
- Hot glue guns
- Uncooked noodles, rice, and/or beans

THEN DO THIS:

Goal - this open ended activity will allow kids to create a brand new "create-ure" that currently doesn't exist using a variety of craft supplies and their unlimited imagination.

As the kids create, they will need to:

- Decide on a name for their create-ure
- Decide what type of food it eats.
- Decide how it would protect itself from predators.



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Monarch Butterflies: Life Science Exploration

Tested, edited & approved by:

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EDUCATIONAL VIDEOS ABOUT MONARCH BUTTERFLIES:

- Watch a Breathtaking Monarch Butterfly Swarm
- Fixing a Broken Butterfly Wing
- Monarch Butterfly Metamorphosis time-lapse FYV

ACTIVITIES IN THIS MINI UNIT

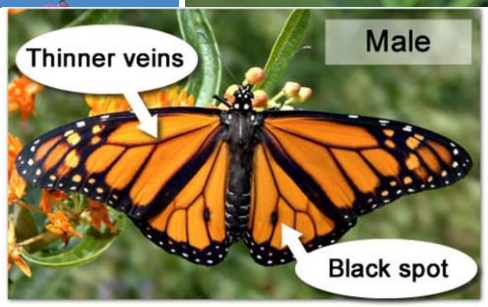
1. Creating Butterfly Feeders
2. Making a Butterfly Suncatcher
3. Recycled Butterfly

If possible, have milkweed plants/pods on hand to introduce the unit. In the fall, Milkweed plants are plentiful in the roadside ditches in Nebraska. They can easily be collected and used during the unit.

BUTTERFLY INFORMATION

MALE OR FEMALE?

Males have a small black spot on the top surface of the hindwing. Females do not.
You can see the spot when the wings are open; sometimes it's faintly visible when the wings are closed, too.
Males also have slightly thinner wing veins amd are a bit bigger
Although not evident in these pictures:
— females tend to be slightly darker than males.
— the tip of the abdomen of the male and female are visibly different.

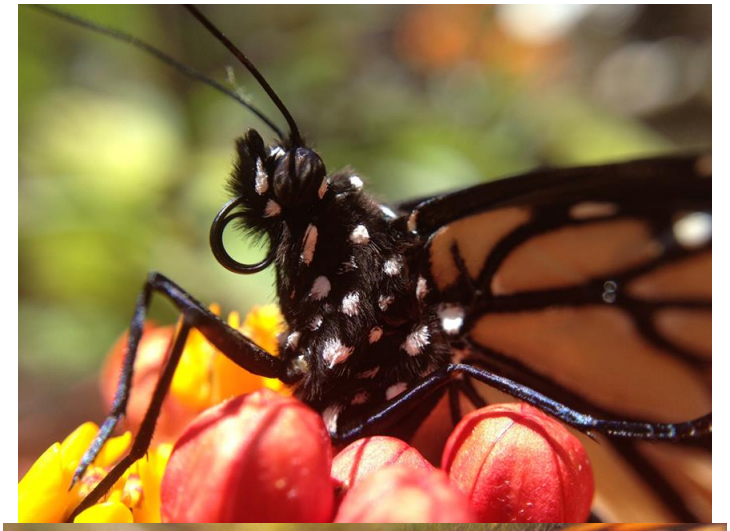


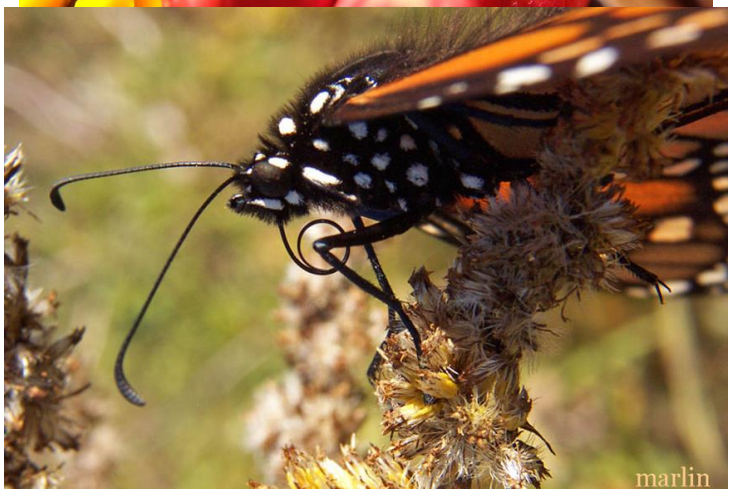
HOW MONARCHS SMELL AND TASTE

Monarch's smell with their antennae,
Nectar and water are tasted by hairs on their legs and feet.
Monarchs travel 100 each day on their way to Mexico. 2,000-3,000 miles total!

MONARCH COLORS

The monarch butterfly's bright colors serve as a warning to predators that they are poisonous, and they should attack at their own risk! Monarchs not only taste bad, but they are poisonous due to the presence of cardenolides (a type of steroid) in their bodies, which the caterpillars get from the milkweed they feed on.





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MAKING BUTTERFLY FEEDERS

GATHER THIS:

- Cardboard plates/pie tins
- Hole punch
- Yarn - four, 2-foot lengths for each student
- Pony beads
- Recipe for butterfly food (below)
- Small pieces of new sponges for each student
- Small lidded plastic containers (3 oz size)
- Sandwich baggies to make into “Butterfly Lunch bags”
- Copies of “Butterfly Lunch Bag” Info. pages for each student.

THEN DO THIS:

Preplanning

- Hole punch 4 evenly spaced holes in each plate at positions 12, 3, 6 and 9 (as if on a clock). Cut yarn into 2 foot lengths. Each child will need 4 for their feeder
- Cut clean, new kitchen sponges into 1” x 2” sections, one/student
- Created a finished feeder to show the kids.

Instructions

Discuss the needs of butterflies, difference between male/female monarchs, migratory patterns through Nebraska as they head to Mexico for the winter months.
Migrating Monarchs are always in search of food and water. Kids can help their winged friends by making Butterfly feeders to take home.

1. Kids select yarn and tie one end of each length to their plate.
2. Slide a variety of pony beads onto the yarn to decorate the feeder.
3. Tie the 4 lengths of yarn together at the top

Make Butterfly Nectar together as a group (or you can prepare the nectar ahead of time).
Needed:

- Wisk
- 10 Cups Water
- 1 C. white cane sugar
- 1 Tablespoon Regular Soy Sauce

No Boil Instructions
Add your water to the pan. Add the sugar into the water. Stir the mixture well until the sugar dissolves. Add Soy Sauce and stir well. Pour the mixture into individual plastic cups for each child. When they take their feeder home, they may pour the nectar over the sponge so butterflies can sip. Store excess sugar water in the refrigerator for up to 4 weeks.

Boiling Instructions (ingredients stay mixed better)
Add your water to the pan. Place on the stove and boil the water for 15 minutes. Take the water off the heat and immediately add the sugar. Allow the sugar water to cool to room temperature. Add Soy Sauce and stir well. Pour the mixture into the individual plastic lidded cups. Fill a clean butterfly feeder with nectar. Store excess sugar water in the refrigerator for up to 4 weeks.

Butterfly Lunch Bag
To feed butterflies, hang your feeder in a safe sunny spot outside, put the sponge on your feeder and pour nectar (sugar/water) onto the clean sponge. Add some fresh fruit around the edges – fruits with high water content work best. Good choices include:

- Strawberries
- Watermelon
- Mangoes
- Oranges
- Peaches
- Grapes

Watch the butterflies enjoy their lunch!

Send kids home with:

- Completed butterfly feeder
- A baggie with a clean sponge and a 3 oz plastic container of butterfly nectar with the Butterfly Lunchbag sheet stapled to the top of each bag.
- They can add fresh fruits to their feeder at home. Replenish daily.

BUTTERFLY SUNCATCHERS

Did you know that you can blend colored pencil art with baby oil? It's actually a fascinating trick that makes your colored pencil projects look absolutely amazing!

TIME:

30-40 Minutes

GATHER THIS:

- Colored pencils
- Sharpeners
- Butterfly suncatcher printable for each student
- Q-tips
- Baby Oil
- Paper towels
- Newspaper to cover tables and scrap paper
- Scissors
- Small disposable cups (3-4 oz size)

THEN DO THIS:

- Cover tables with newspaper to protect surface from baby oil
- Kids Color each of the shapes inside the butterfly in any bright colors using colored pencils. Encourage them to have fun and take some time to relax!
- Now, for a little bit of magic! (Or shall we say SCIENCE!)
- Kids grab 5-6 of cotton swabs and pour a small amount of baby oil into a disposable cup. About ¼ inch of oil is all that's needed in each cup.
- Have paper towels on hand.

Demonstrate the following:

- Dip the tip of the cotton swab into the baby oil. Hold the cotton swab like a pencil, and rub it on the colored area with the same amount of pressure that you use to color.
- The colored pencil strokes smooth out and blend together like magic!

- Hold the demo. Butterfly up to the light and show how the light shines through the area with the oil. Cool!!

- Have the kids work slowly and start a tiny amount of oil on their Qtip and on their paper. **They can always add more oil.**
- Kids can re-dip the colored cotton swab into the oil if they need to "reload". They'll notice they need more oil when the colored pencil isn't blending as easily.

Recommended: use a different cotton swab for each color family so colors don't mix/blend together.

The image dries almost immediately. Blot with the paper towel as needed.

If you hold the image up to the light, you will notice it's a bit splotchy where you might have gone heavy on the oil. **To Fix this** - and to let the sunlight shine evenly through the image, place a scrap piece of paper under the image to protect the workspace. Place the image face-down on the scrap paper.


Use a clean cotton swab and dip the end into some baby oil. "Color" the entire **back of the image** until you see the color and design start to show through.

Once the entire image has been revealed via the baby oil, use a paper towel to blot up any excess oil. It dries quickly, but any extra oil will just sit on top. Discard any unused oil, all of the used cotton swabs, and the scrap piece of paper.

Use scissors to carefully cut around the outside border of the butterfly. Younger children may need help from an adult (or older child) with this step.


Kids may take their suncatcher home and tape it to the window and enjoy the bright colors throughout the day!

RECYCLED BUTTERFLY CRAFT

TIME:

20-30 Minutes

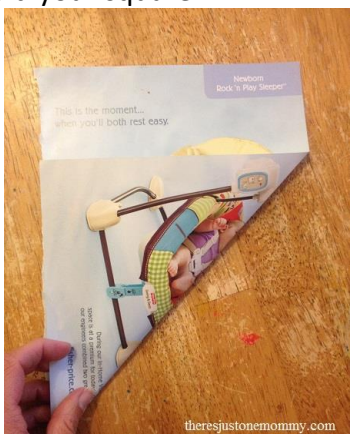
GATHER THIS:

- Old Magazines
- Pipe Cleaners
- Scissors

THEN DO THIS:

Begin by looking through magazines for full colorful pages. Advertisements are great!
For the top wing, m
You will need 2 magazine pages for each butterfly.

For the top wing, make a square with on of the magazine pages. Start by folding the paper diagonally, making sure the side line up. Cut off the extra portion.
Once you've cut off the extra, unfold your square.



Starting at one corner of the square, fold the paper accordion-style.
Make each fold approximately 1/2 inch wide. Younger children may need help with this part.

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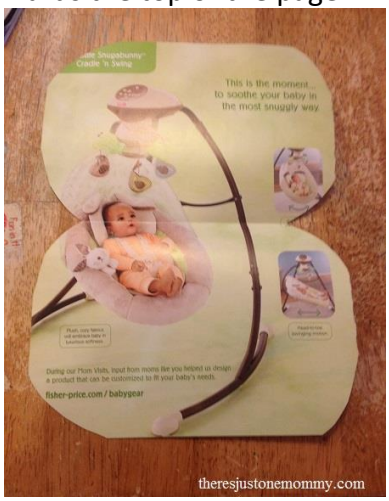
Next, you will make the butterfly's bottom wing.
Take your second magazine page and fold it in half length-wise.
Use scissors to round off the corners.
Unfold your magazine page. It should look like the picture to the left.
Once again you will fold the page accordion-style. This time start at the bottom, making each fold 1/2 inch wide as you work towards the top of the page.



Once your two pages are cut and folded, it's time to put them together.
Place the 2 pages together and wrap a pipe cleaner around both wings. The larger wings should be on top.
Twist your pipe cleaner tightly to hold the butterfly together.
The top portion of the pipe cleaner will become antennae.
Add string or fishing line and hang butterflies if desired.

FLAPPING BUTTERFLY CRAFT

Use drinking straws to create the moving wings of a butterfly. This activity is a great addition to a unit on butterflies.

TIME:

25-30 Minutes

GATHER THIS:

- Two straws, one thinner, one thicker
- Cardstock
- Markers
- Scissors
- Tape
- Glue
- Ruler
- Butterfly template (link below)

https://onelittleproject.com/wp-content/uploads/2022/07/Butterfly-Craft-2.jpg

THEN DO THIS:

Step 1: Decorate butterfly

Print your butterfly template on coloured cardstock. Decorate the butterfly however you'd like! Use a black marker to color parts of the butterfly. Markers, stickers, paint pens can be used to add color to the wings. Then Cut out the butterfly

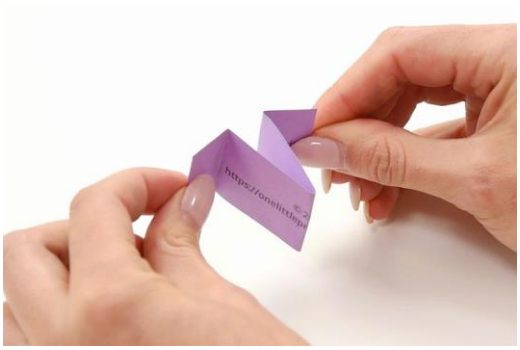


Step 2: Make butterfly backing

On the scrap cardstock draw a rectangle 1-1/4 inches high and 4-1/2 inches long. Cut out the rectangle.

Measure 3/4 inch from each of the short ends and mark with a pencil

Fold the cardstock on these marks. Then fold the cardstock in half in the other direction so the folded tabs face outwards.



Fold the butterfly in half, and then unfold it again, setting the decorated side face down.

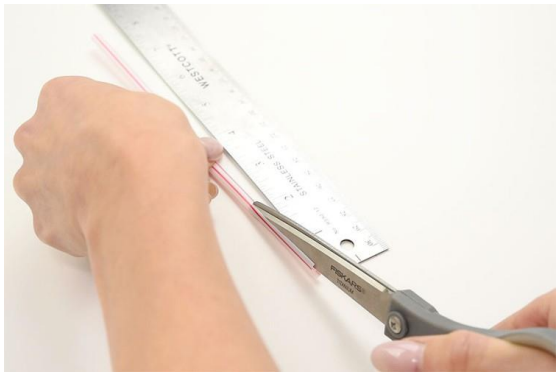
Add glue to the tabs of the cardboard.Attach the tabs to the center of the butterfly, lining up the crease in the butterfly with the tabs and fold.

Step 3: Cut and connect straws

Cut off about 2 inches from the straw with the larger diameter (in our case, we cut off the entire bendy part of the straw).

Cut a slit in the straw 2-1/2 inches long. Rotate the straw 180 degrees and make another slit the same length, directly across from the first slit.

Cut a 2 inch slit in the smaller straw. Again, turn it 180 degrees, and make another 2 inch slit, directly across from the first slit.



Open the two flaps in the smaller straw and slide it over the folded backing of the butterfly. Center it and tape it in place on the cardstock.

Slide the larger straw over the smaller straw. Again, separate the two flaps in the straw and push it up as far as it will go on the butterfly's wings.

Take a 3 inch piece of tape and attach the flap of the larger straw to the wing so there's about 1-1/2 inches of tape on the wing and 1-1/2 inches of tape on the straw flap. Then take another piece of tape and wrap it tightly around the first piece of tape on the straw flap.

Repeat the taping on the second wing.

Unfold the butterfly and see how the straws control the movement of the butterfly's wings.

Hold the longer (inside) straw with one hand and use your other hand to move the shorter (outside) straw up and down.

LAB

Tested, edited & approved by:

Sarah Springer, Aurora High School Senior

Morse Code Bracelets

TIME:

20-30 Minutes

GATHER THIS:

- String
- Morse Code Beads for Bracelet: you can order them here: https://a.co/d/0nOk2SA
- Morse Code Cheat Sheet (attached)

TALK ABOUT THIS:

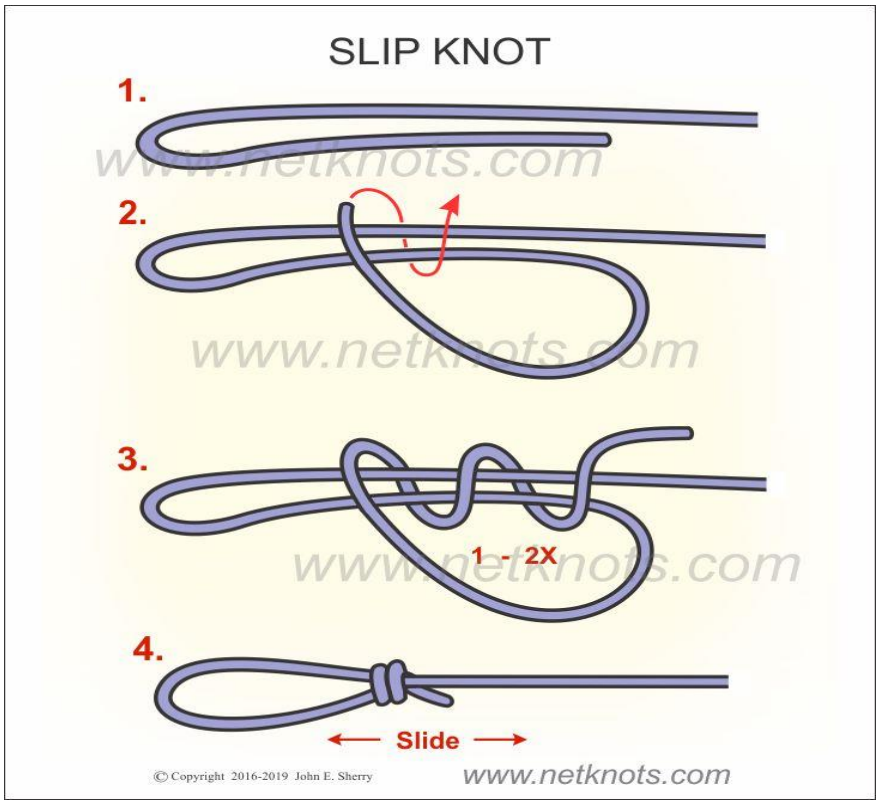
Morse Code is a code for translating letters to dots • and dashes —. These represent a short and long signal duration.
Samuel Morse developed the code in the 1830's to send messages through the telegraph machine.
How Does it Work?
Electrical signals are translated to auditory or written dots and dashes.
-Played a critical role in World War II for the NAVY. It was more secure and traveled a longer distance than voice telephone!
Morse Code as Spoken Language
As 'code talkers' grew more and more comfortable with Morse Code, they eventually stopped needing to reference an alphabet chart, and could translate letters just by hearing the long and short beeps. This led to the development of Morse Code as a spoken language rather than just a written one
Here's a Video from The Big Bang Theory of Sheldon speaking morse code!
Fun Fact:
Morse code was designed so that the length of each symbol is inverse to its frequency of occurrence in the English language (more common=shorter and vice versa)

- The most common letter in the English language is 'E', thus the Morse code for 'E' is a single dot: •
- The next most common letter is the letter 'T', thus the Morse code for 'T' is a single dash: —

THEN DO THIS:

1. Print out Morse Code sheets and have the students take a few minutes to look at the card.
2. Use one color of beads for dots and dashes, and the other color for spaces between letters
3. Have the students write out what they want their bracelet to say, their name or a little message, and then have them use the morse code cheat sheet to put the beads on the string so that they spell out their message.
4. Tie a slipknot to secure the bracelet.
5. Go around in a circle and have the students use their morse code cheat sheets to guess what others students bracelets say!

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



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LAB

Ninja Stress Balls

TIME:

15-20 Minutes

GATHER THIS:

- Balloons – white or yellow for the face, and other colors for the ninja mask
- Scissors
- Sandwich baggies – either fold-over or ziploc (if you use ziploc, you'll have to cut the zipper off)
- Flour
- Ballpoint pen

THEN DO THIS:

Step 1: Fill a baggie with 3/4 cup of flour. Filling a baggie is SO much easier than trying to stuff a balloon with flour!
Step 2: Fold over the baggie and squeeze out all the air. Cut the blowing end off of a white balloon so that you are left with a round balloon with a hole.

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Step 3: Stuff the baggie filled with flour into the balloon.

Step 4: Cut off the blowing end of another balloon. Cut an opening for the ninja face. Then, stretch this balloon over the white balloon with the opening facing the opposite way (so that the flour baggie can't come out). Add a ninja face with a **ballpoint pen**. We tried Sharpie initially, and the faces kept rubbing off when the boys played with them. We made another ninja ball and used ballpoint pen, and the face still looks great even after lots of handling.


If you find that even ballpoint pen ink comes off, try a different pen.

LAB

Orbeez Stress Balls

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TIME:

15-20 Minutes

GATHER THIS:

- 1 clear balloon (12 INCH)
- 1/2 teaspoon water beads (ORBEEZ OR OTHER BRAND)
- 1/2 cup Water

THEN DO THIS:

Begin by talking about what stress is and what a person can do to get rid of stress.

Have kids share what they do when they feel stressed. Then touch base on the following suggestions:

Exercise/moving around, deep breathing, think of something happy and relaxing, do something fun/something they enjoy, listen to music, journaling, eat a healthy snack, talk to someone who you trust to help you work through the stress.

Tell the kids that they will have the chance to create two items to take home today that they can use for fun and to help if they are feeling stressed. They will be making STRESS BALLS.

Procedure

Step 1: Add Orbeez to the balloon

- Blow up the balloon, then let it deflate to stretch out the latex/rubber.
- Place the neck of a funnel into the balloon's opening, making sure it's tight or completely inserted.
- Pour water beads into 1/2 teaspoon measuring spoon.
- Then pour the premeasured Orbeez into the funnel. Gently shake to ensure all Orbeez are inside the balloon.

- Remove the funnel from the balloon.

Step 2: Add water to the balloon

- Carefully stretch the neck of the balloon around a kitchen or bathroom faucet.
- Place a 1/2 cup measuring cup under the balloon. Turn on the tap slowly to create a light stream of water into the balloon.
- Turn the tap off when the balloon fills the measuring cup.
- Remove the balloon from the tap and tie a knot in the balloon, as close to the water line as possible.

Step 3: Let the Orbeez grow!·

- Set the balloon on its side and wait 3 - 4 hours for the Orbeez to fully expand inside the balloon.
- Be sure to check in while the Orbeez are growing to see the "magic" happen! It's fun to watch the half grown Orbeez floating around inside.
- Use scissors to trim the excess balloon neck, cutting just above the knot.

How long do Orbeez stress balls last?

These stress balls should last about 2 weeks – but that's not a guarantee. They're really fun to squeeze and they get squeezed a lot harder than other stress balls (just because it's so fun to see the water beads in the stretched balloons!), so they may not last that long.

We made two Orbeez stress balls and one of them lasted a month, and the other one only lasted 24 hours. We squeezed our first one like crazy and by the next day it had a tiny pin sized

hole in it. I could hear water bubbling out of the tiny hole when I squeezed it and my hands were getting a little wet, so I threw it away.

Balloons become fragile over time and you really don't want to clean up a water bead mess if it pops in a drawer somewhere. So make sure you keep track of your Orbeez stress ball and don't forget about it!

LAB

Paper Chain STEM Challenge

TIME:

20-40 Minutes

GATHER THIS:

- One piece of colored construction paper
- Scissors
- Masking tape

Additional Materials - measuring tape

THEN DO THIS:

One thing about this **quick STEM activity** is the setup time! The supplies are easy to grab at a moment's notice so that you can try this STEM project immediately. Everyone gets a sheet of paper, a pair of scissors, and tape.

But everyone gets **only ONE sheet of paper**, so make it count! Kids can do multiple trials–encourage learning!!

STEP 1: Give out supplies to each person.

STEP 2: Give a minute or two for a planning phase. Have them brainstorm and discuss what methods may produce the longest chain.

STEP 3: Set a time limit (15-20 minutes is ideal).

STEP 4: Once the time is up, have the kids lay out the chains on the table or floor to see which one is the longest.

Hint: Incorporate extra math in this step!

- Grab a measuring tape to measure and record each one.
- Count the links for the youngest kiddos.
- Round the measurement to the nearest whole number or include the fractions. (depending on the ages of your kids).
- Graph or record the results.
- Make comparisons between the paper chains using < > =
- Subtract the shortest from the longest.
- Add all of the lengths together.
- Estimate how many sheets of paper it would take to make a chain as long as the room using the type of chain you made. Bonus: try it!

STEP 5: If it works for you, have each kiddo share his/her thoughts on the challenge. A good engineer or scientist always shares his/her findings or results.

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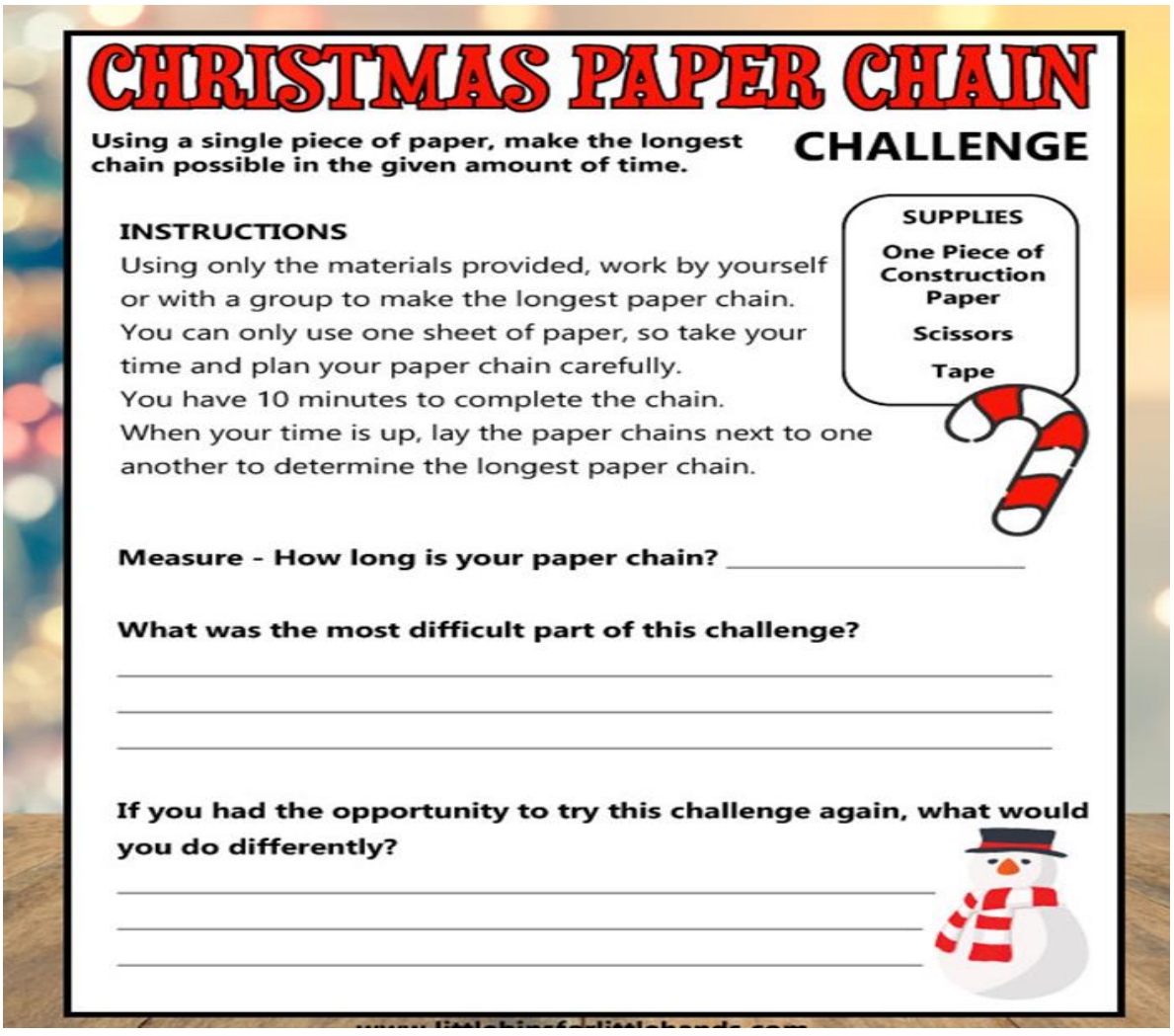
Shawna Vinkenberg,
Edgerton Afterschool
Coordinator

Ask a few questions:
Questions for reflection are a great way to start the conversation because sharing ideas and communicating findings is a huge part of the STEM process.

- What factors contribute to one chain being longer than the other if they are each made out of the same size sheet of paper?
- What was the most challenging thing about the STEM project?
- What would you do differently if you had a chance to try it again?
- What worked well and what didn't work well during the challenge?

STEP 6: Have fun!

This activity may be used at any time of the year simply changing up the color of the paper.



Lab

Paper Plate Magnet Maze

Tested, edited & approved by:

Shawna Vinkenberg, Edgerton Afterschool Coordinator

GATHER THIS:

- Paper Plates (10 3/8 inch plain paper plates)
- Chopsticks
- Strong Magnets (any strong 18 mm button magnets will
- do)
- Glue (tacky glue or hot glue) and Glue Sticks
- Markers/colored pencils
- Scissors
- White Cardstock
- Magnet Maze Template (click link - print the maze, bunny/space shuttle on card stock)

THEN DO THIS:

1. Carefully cut out the maze and graphics. (Encourage your students to create their own maze characters and themes. Ex - Rabbit getting a bunch of carrots, rocket going to the moon, football player going to a goalpost, dog finding its bone, snowman getting to its hat.)
2. Use a glue stick to attach the maze to the paper plate.
3. Glue or draw the graphic in the center of each maze.
4. To make the magnet wand use tacky glue/cool temp glue to attach a magnet to the end of a wooden chopstick.
5. Place a small blob of glue onto the magnet, then lay the chopstick on top of the glue.
6. Create the object to run through the maze. set about making the magnet graphic.
7. Before gluing the magnet to the cut out characters with tacky glue/ hot glue, make sure the side that would be facing the plate was of the opposite polarity than the magnet wand. (ie - make sure your wand and object on your magnet will attract and stick together, not repel each other).

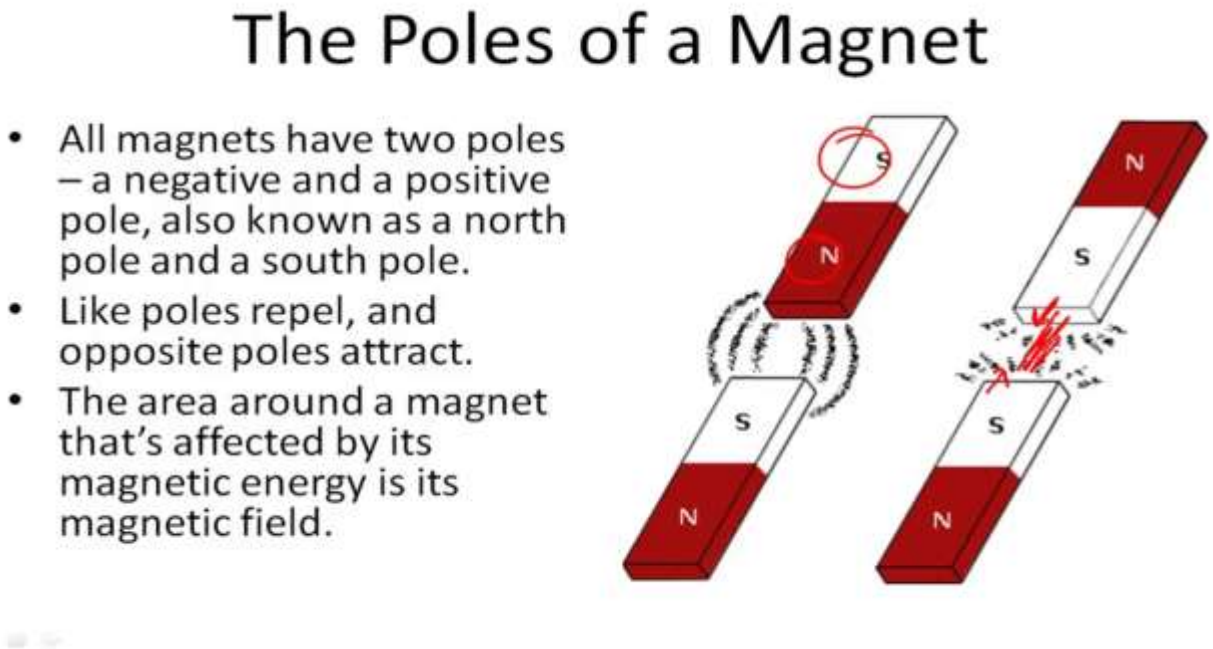
WHAT IS HAPPENING?

- Matter (anything that has mass and takes up space) is made of tiny particles called atoms. Atoms have negatively charged electrons that spin around them and this tiny movement of an electron around its nucleus is enough to create a small magnetic field.

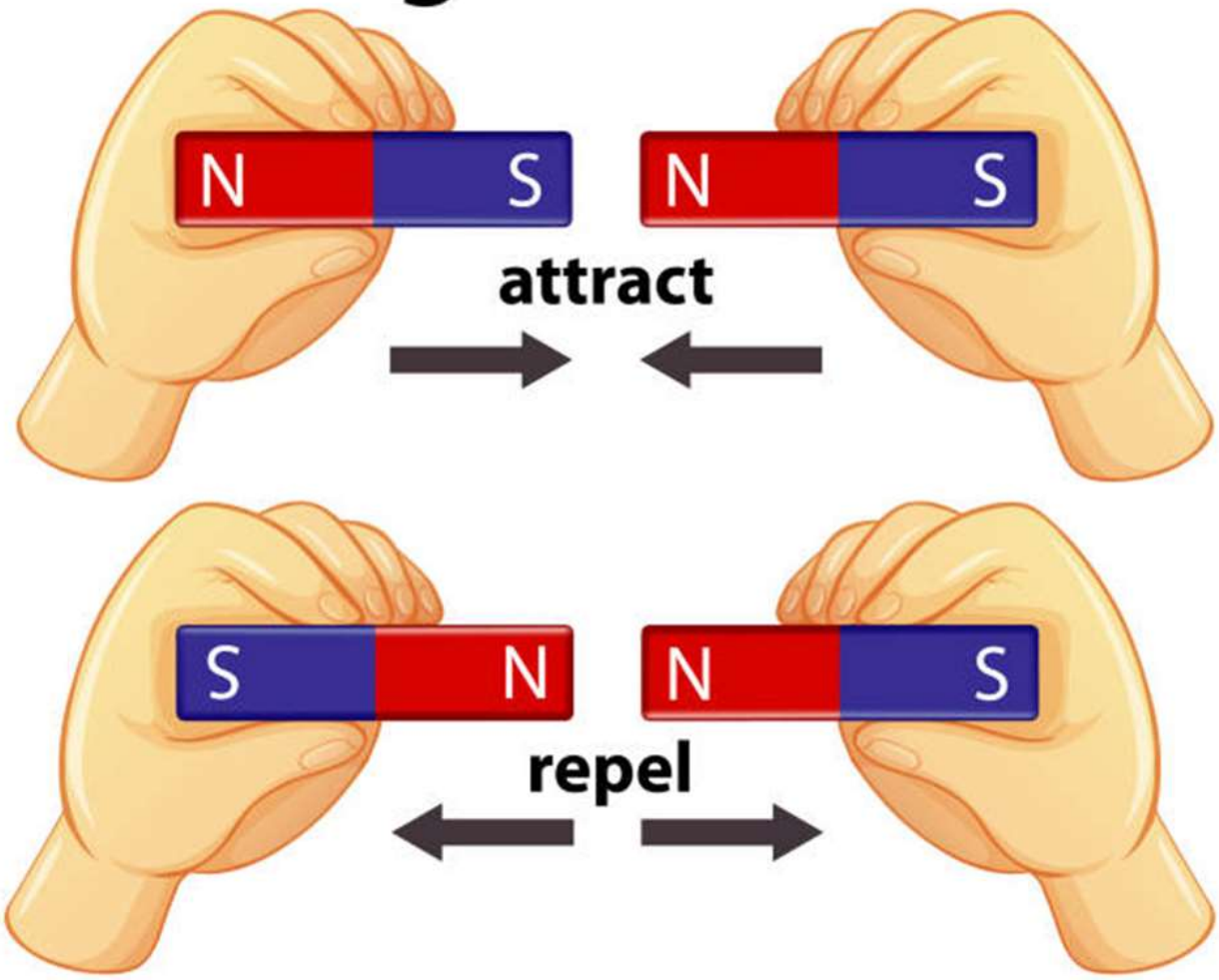
- If an element has paired electrons that spin in opposite directions, their magnetic field cancels each other out. If an element, such as iron, has unpaired electrons that spin in the same direction, they have no opposing magnetic fields to cancel their own magnetic fields and they create the invisible force called magnetism.

- Magnetic fields are dipolar, meaning they have two poles. The two ends of a magnet are called the north and south poles. As my kids learned when the two magnet wands wouldn't stick together, matching poles repel while opposite poles attract.

- The poles are the parts where the magnets are strongest. Around these poles is an area known as a magnetic field. For another object to be drawn to the magnet, it has to be within its magnetic field. And that is how a magnet can exert control over another object without even touching it!



Magnetic Force



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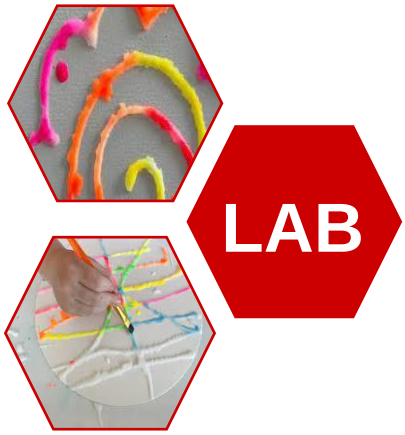

Raised Salt Painting

TIME:

35-40 Minutes

GATHER THIS:

- Card stock
- Squeeze bottle of glue (such as Elmers)
- Table salt
- Diluted food coloring
- Paint brushes or Droppers
- Pencils
- Cookie sheets or trays to catch excess salt (excess may be reused on projects)

THEN DO THIS:

Before kids arrive - use individual cups to mix up the diluted food coloring. About 15-25 drops per 4 oz of water works well. Use newspaper or plastic to cover table surfaces.

1. Have kids put their name on the back of their card stock. Black cardstock is a fun option!
2. Brainstorm ideas of what they could create using their glue bottle as a drawing tool. (Demonstrate examples on a sheet of cardstock using the glue bottle). Kids can simply make designs or use their pencil to create a simple picture
3. Use glue to trace or create designs on the card stock
4. Carefully sprinkle salt onto cardstock until the glue is thoroughly covered. Tip to let excess salt fall away. Use a baking dish or tray to contain the excess salt so it can be reused on another project..
5. Dip the paint brush into diluted food coloring paint then gently **touch** to the salt-covered glue lines. Watch the paint magically travel in both directions as the salt absorbs the liquid! It's almost like magic- except it's SCIENCE!
6. Important --Use only a little water color at a time!!!
7. Let dry thoroughly. (may take a full day or two). The color of the dye will fade as it dries.

Tested, edited & approved by:

Sarah Springer, Aurora High School Senior

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LAB

Slime

TIME:

15-20 Minutes

GATHER THIS:

- 18oz Solo Cup
- 3oz Dixie Cup
- 3.5 oz of Glue
- Water
- Borax Solution (mix one cup of borax laundry detergent to one gallon of HOT water)
- Food Coloring
- Glitter (optional)

THEN DO THIS:

1. Fill two dixie cups full of water and pour it into the red solo cup
2. Add your color
   a. Only put 1-2 drops of food coloring into your water
3. Add the glue. Make sure to scrap the sides of the container to ensure you get almost all of the glue.
4. If you want to add glitter, do it now and continue stirring your
5. Mix up the glue and the water well.
6. Add the cup of borax and QUICKLY start stirring.
   a. The borax will immediately start hardening, so you need to start stirring right away!
7. Put your slime in the Ziplock bag and enjoy!

Be sure not to get slime on the carpet, in your hair, or on your clothes.

Vinegar is the best way to get slime off your clothes

Tested, edited & approved by:

Journey Noyes, UNK Senior

LAB

Snowman Air Cannons

TIME:

30 Minutes

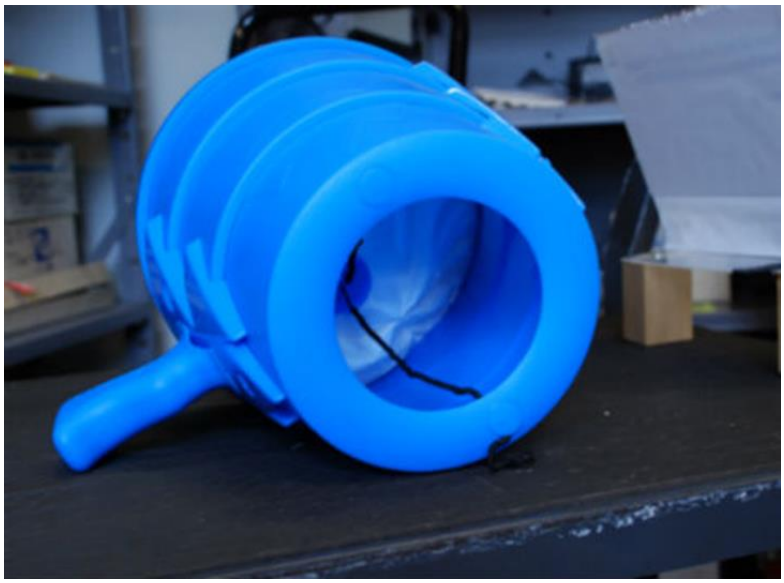
GATHER THIS:

- White paper cup
- Balloons
- Scissors
- Markers
- Marshmallows
- pom poms
- Measuring tape or ruler
- Masking tape
- Containers to use as targets

THEN DO THIS:

Get the class's attention by showing a real air cannon (Airzooka) or showing the following video that demonstrates how it works.

Rapid compression of a focused pocket of air creates a burst of compressed air that can be fired at distracted students to focus their attention.



Video: [Airzooka Air Cannon | Arbor Scientific - YouTube]

Tested, edited & approved by:

Shawna Vinkenberg, Edgerton Afterschool Coordinator

Process:

1. Carefully poke a hole in the bottom of the paper cup with scissors and cut out the entire bottom

2. Tie the balloon

3. Cut the bottom of the balloon off, leaving the knotted end.

4. Stretch the balloon over the bottom of the cup. This is your shooting end and can become the hat of the snowman!

5. Use masking tape to secure the balloon to the cup

6. Use markers to decorate the cup. Snowmen are fun, but the kids can be encouraged to turn their cannon into anything they would like!

7. Put a marshmallow or pompom into the cannon, pull back the balloon knot and let it go! This might take a few practice tries.

Challenges for kids to try with their cannons:

1. Use an open area of your classroom/center and lay out a 25' measuring tape. See how far kids can launch their marshmallow/pompom.
2. Set up plastic containers and give each a point amount. Kids try to shoot their ammo into the targets to receive points.
3. Set up Styrofoam cups into pyramids and see if the kids can use their cannons to knock them down.

LAB

Solar System Bracelets

TIME:

5-10 Minutes

GATHER THIS:

String

Solar System Beads: you can order them here: https://a.co/d/cR1hZMz

TALK ABOUT THIS:

Here is some information about each of the planets:

1. **Mercury:** is the smallest, and the fastest planet. It goes around the sun in 88 days. It also has no moons or rings.
2. **Venus:** Venus takes 225 days to go around the sun. It is the second brightest object in the night sky.
3. **Earth:** The Earth is covered with 70% water. It takes 365 orbit the sun and its axis it tilted at 66 degrees
    a. **Moon:** The moon is a natural satellite to the earth and the brightest object in the night sky. It has no atmosphere and less gravity than earth.
4. **Mars:** Mars is the second smallest planet and has two moons. Its atmosphere is made of mostly carbon dioxide.
5. **Jupiter:** Jupiter is the biggest planet in our solar system. It's like a star, but it never got big enough to start burning. Jupiter is covered in swirling cloud stripes. It has big storms like the Great Red Spot, which has been going for hundreds of years.
6. **Saturn:** Saturn with its unique ring system orbits the sun once every 29 years and has around 82 moons.
7. **Uranus**: Uranus isn't visible without a telescope. Its axis is 98 degrees, so it rolls on its side around the sun.

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8. **Neptune:** Neptune is the smallest gas planet and takes 165 earth years to orbit the sun. The gases in its atmosphere give it the deep blue color.
9. **Pluto:** Pluto is a dwarf planet, one of five. At one point, it was known as the ninth planet of the solar system. It has 5 known moons.

Additional Facts:

10. **The Sun:** The sun is composed of hydrogen and helium. One million earths, approximately, could fit inside of the sun. It takes roughly eight minutes for light from the sun to reach earth
11. **Asteroid Belt:** The asteroid belt is located between the orbits of Mars and Jupiter. There are many asteroids, but most are fairly small and spread out inside of a large area. This allows for spacecrafts, pass through it relatively easily.

THEN DO THIS:

As you go through each of the planet, have the students first guess which planet is which, and then when they guess correctly, have them put the planet on the string.

There are ten beads that look like asteroids and ten gold beads for the students to use to add their own flare to their bracelet! Allow them to put these beads on wherever they would like on the bracelet.

LAB

Tested, edited & approved by:

Shawna Vinkenberg, Edgerton Afterschool Coordinator

Styrofoam Geoboard

TIME:

30 Minutes

GATHER THIS:

- Pieces of thick Styrofoam (1 1/2" or thicker) pre-cut into manageable sizes (5" x5" or similar sizes are easy for small hand to handle.
- Cookie Cutters {any shape}
- Small thin finishing nails (1 inch size)
- Loom rubber bands in all colors.
- Pencils

THEN DO THIS:

- Cover table surfaces to protect from permanent markers.
- Draw with permanent markers on plastic cups. (Encourage creativity!) The more color the better.
- Hole punch the cup in one place around the rim – you will not be able to punch a hole in them once they melt.
- Place on cookie sheet covered with foil and put in preheated oven (400 degrees) You may want to do a trial run in your oven beforehand as all ovens are a bit different
- Turn the oven light on and watch until the cup shrinks down to a flat circle. Note that only the suncatcher in the middle of the cookie sheet will be completely flat. A pancake flipper can be used to help flatten each suncatcher once they come out of the oven.
- Allow to cool a few minutes before having the kids pick up and handle.
- Thread a string through the hole and hang in a window or on a tree outside.

Introduce the activity---Kids will be making Geo Boards today out of Styrofoam, nails and bands.

Discuss the word "Geo." Geo- sounds like **geometry** (write this word on the white board). In Geometry people study lines, points, and shapes.

Have the kids name some shapes. Draw these on the board. (square, circle, triangle (draw several types of triangles), rectangle, star, heart, etc.)
Have the kids go on a "Shape Hunt" around the room. Call out the name of a shape and point to that shape on the board. Kids walk around the room and stand next to something that is that shape. Repeat this with several other shapes. Have them look at clothing, shapes in the cabinets, tables, floor, ceiling, etc.
Demonstrate the activity. Explain that there will be two ways for them to make a geo board on Styrofoam:

1. Kids may simply experiment and create their own by drawing shapes with a pencil or
2. Use a Cookie Cutter.

Place a cookie cutter of choice on top of the styrofoam. When you have your cookie cutter in the right place, push a nail in at the points of the star.
Put one nail at the top of each point, one at the dip of each point and one in the middle of the star. Loom bands only have so much stretch, so depending on the size of the cookie cutter you might need to add extra nails in the middle.
Once your nails are set up, have some geometric shape fun! First you have the outside shape of the geoboard, but then you can create so many shapes within the shape too! Make patterns, Explore symmetry. How many shapes within the shape can you create? Use different colors!

Hints: push the nails in so only about ¼ inch is above the Styrofoam.
Reposition the nails if they are too close together or too far apart. Encourage *Trial and Error.*
It's ok to experiment and redo if something is not working.

Encourage creativity and using various colors of bands.
Small areas of the styrofoam may be also used to create other geometric shapes of their choices.

LAB

Tie-Dying with Permanent Markers and Rubbing Alcohol

Tested, edited & approved by:

Shawna Vinkenberg, Edgerton Afterschool Coordinator

GATHER THIS:

- Plastic cups (at least 2/students)
- Rubber bands (at least 2/per student)
- Colorful assortment of permanent markers
- 70% isopropyl alcohol, also called rubbing alcohol in small containers
- Medicine dropper/pipette for each student
- White bandana that can be dyed (cotton fabric works best)
- Plastic rolled tablecloth to protect your work surface.
- Optional: Hair dryer
- Masking tape to put names on each bandana
- Paint shirt for each student

THEN DO THIS:

Demonstrate each step below with kids watching before having the kids create their own. Do a quick tutorial on using a pipette).

1. Lay out the bandana on the surface you will be dyeing it on.

2. Wherever you want to make a design on the bandana, place a plastic cup underneath the bandana and then loop a rubber band around the edge of the cup. This should end up making a flat, tight circle of bandana fabric stretched over the opening of the cup. Do this to at least two places on the fabric so that you have at least two flat circles to draw in.

3. Use the permanent markers to draw some colorful designs in each flat t-shirt circle that you made with the cups. Fill in at least two flat circles with your drawings.

4. Now use the medicine dropper to drop a few drops of isopropyl alcohol onto the center of one of the other flat circles that you drew in. DO NOT over wet the marker lines or fabric. Use colors that complement one another to avoid a "muddy outcome." It can take a few moments for the colors to blend.

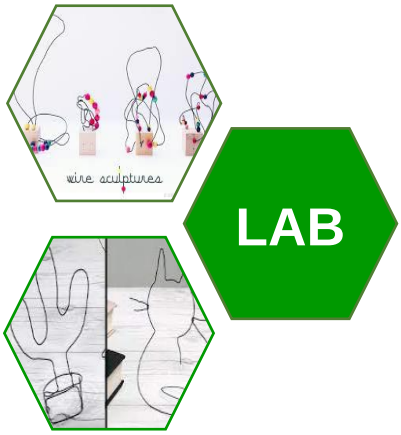
5. Repeat the tie-dye process in other areas of the bandana. Keep the fabric flat and not touching the other areas of the fabric when it is wet, as it will bleed easily.

6. Allow to dry before sending the project home. Use masking tape to put kids' names on their bandana.

WHAT IS HAPPENING:

The Science Behind the Activity: Rubbing alcohol — Ethyl alcohol or isopropyl alcohol (often called 'rubbing alcohol') is very effective at breaking down the chemicals in permanent inks.

Real life Application to discuss: This is handy to know if you get permanent marker on clothing or other surfaces. Liquids with alcohol in them (such as hand sanitizer, hair spray or rubbing alcohol) can help remove the marker.



Wire Sculptures

TIME:

30-40 Minutes

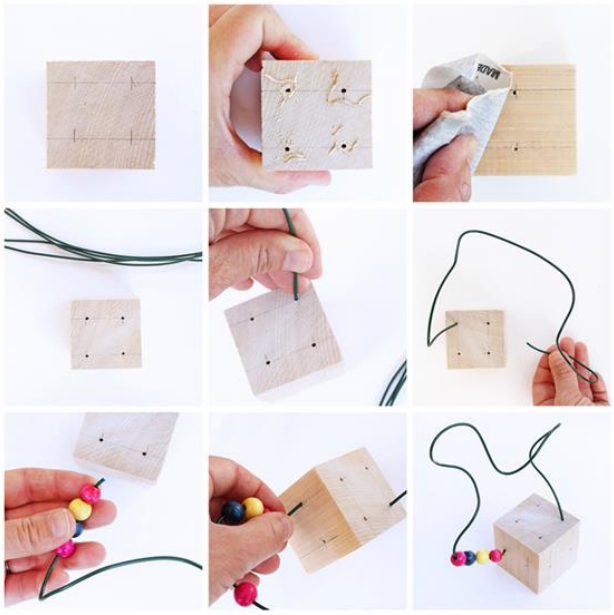
GATHER THIS:

- Flexible gardening Wire – cut into 12-16” sections 3-4 wire sections/student.
- Wood blocks cut from scrap wood.
- Sandpaper cut into 4x4” pieces for each student
- Drill and drill bit (the bit will need to be a smidge larger than the wire)
- Sharp scissors
- Cool temp glue guns
- Pony Beads
- Markers
- Embellishments (stickers, gemstones, etc.)

THEN DO THIS:

Pre-lesson preparations

Pre-cut wood blocks from scrap wood. 2x4s work well. The blocks do not need to be exact cubes.
Use a small drill bit to pre-drill holes in each block. 4 holes on top and about 6 random holes around the sides.



Tested, edited & approved by:

Sarah Springer, Aurora High School Senior

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Process

1. Kids select a wood block and use sandpaper to sand off rough edges around the holes. Demonstrate how to sand the wood, going with the grain of the wood.
2. Kids select 3-4 lengths of wire.
3. Kids fit ends of one wire into the side of the block of wood.
4. Use the cool glue gun to glue one end of the wire in place.
5. Kids string a few beads onto the wire and then twist and shape the wire as desired. Place the loose end of the wire into another hole. Secure the loose end of the wire with glue.
6. Repeat until wires and beads have been used and all ends have been glued.
7. Slide the beads along the wire – they've made their very own wood and bead wire maze!
8. Kids can use markers and embellishments to decorate the wood block if time allows.