



C5ISR CENTER STEM@Home

Welcome to STEM@Home!

As we maneuver the challenges of the COVID-19 epidemic, we strive to continue to make STEM accessible to all.

The STEM@Home Newsletter is intended to be a resource to provide engaging and educational activities that can be done with minimal materials and a whole lot of imagination.

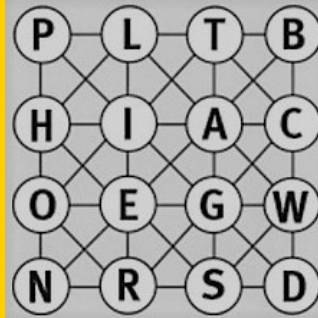


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VOL 2, Issue 3

Brain Teaser



This puzzle contains the names of nine animals. Black lines connect the letters in each name, and each letter is only used once per name.

Can you find all the animals?

Answer on Page 3

STEM IS YOU...

The C5ISR Center Community Outreach Office is pleased to announce our upcoming portfolio of virtual programs for students grades K-12. Programs for October and November 2021:

- Middle School STEM Night (Grades 6-8) – Nov. 10 at 6 p.m.
- STEM Story Hour (Grades K-2) – Nov. 17 at 5 p.m.
- High School Life Hacks (Grades 9-12) – Dec. 13 at 6 p.m.

Registration is on a rotating basis. Visit our registration page for more details:

<https://usarmyc5isrcenter.submit.com>

*Due to COVID-19, programs are currently virtual.

Now is a great time to get involved in STEM...

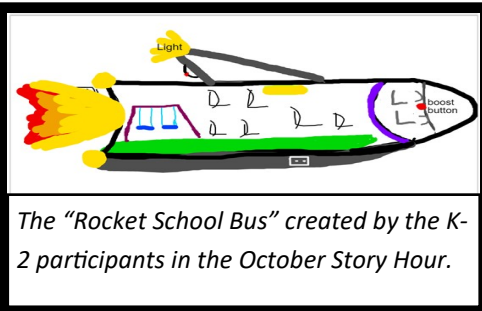
The C5ISR Center Educational Outreach Program is a collection of kindergarten through college-level programs designed to give students access to opportunities in the areas of science, technology, engineering, and math, or STEM.



For more information about our STEM Outreach Programs, visit us on the web:

https://c5isr.ccdc.army.mil/student_programs/

STEM Highlight and Interview



The "Rocket School Bus" created by the K-2 participants in the October Story Hour.

STEM@Home Story Hour: Looking Back On October

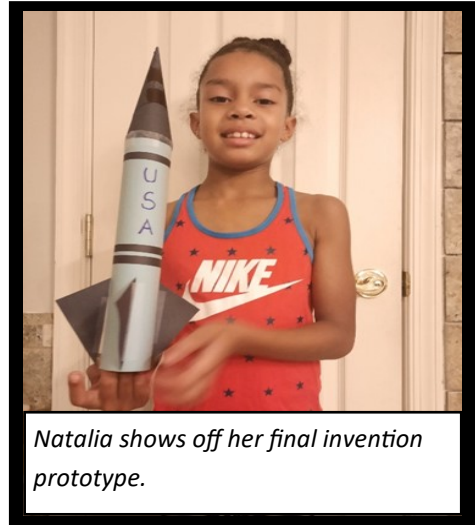
Students who attended our October STEM@Home Story Hour program participated in a mission based activity where they had to help a character named Jack from the book *If I Built a School* by Chris Van Dusen design a new and improved school bus that would transport students to his cool school that

he designed.

The Kindergarten through Second grade students that attended story hour worked as team to design a "rocket school bus". They all provided suggestions about seating and safety needs as well as some fun additions like an in-rocket swing set. Outreach staff used digital whiteboards to turn student ideas into a group design.

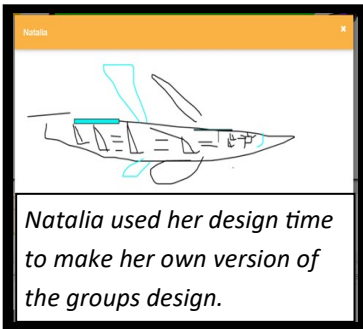
Taking it from design to build.

Natalia L participated in Story Hour and then took the lessons learned to continue her work at home where she designed her own rocket named "U.S.A Track Speed".



Natalia shows off her final invention prototype.

We asked her a few questions about her incredible design and her STEM@Home experience.




Natalia used her design time to make her own version of the groups design.

What is the power source of your invention?

"Metallic Hydrogen is used as the power source."

What was your favorite part of STEM@Home Story Hour?

"My favorite part of the STEM@Home Story Hour was listening to a new book that I have never read. I also liked that I could draw a picture of my own rocket and make one at home."



Have you been a part of one of our STEM@HOME events and have an invention you would like to share? Have your grownup email us at usarmy.apg.devcom-c5isr.mbx.outreach@army.mil and your invention could be included in a future issue of our STEM@Home Newsletter!

STEM Challenge

Design a Turkey Trap Device

It is almost Thanksgiving and there are many people looking to catch a turkey. Poor Gobbles the Turkey did not listen to his parents and wandered off in the woods to play in the leaves. He may cross paths with hunters unless you quickly design a device to trap him in order to save him from becoming someone's dinner. Save Gobbles the turkey by trapping him before someone else catches him.



Mission:

Gobbles the Turkey needs your help to design to a turkey trapping device so that you can save him from becoming someone's dinner.

Materials	Cost
Pipe Cleaners	\$190 for 10
Cardboard piece	\$200
Printer Paper	\$50 per sheet
Construction paper	\$60 dollar per sheet
Popsicle sticks	\$100 for 10
Straws	\$75 for eight straws
Glue	\$50
Cardboard paper towel/ toilet paper roll	\$150
Tape	\$50 for 12 in
Cups	\$250
Other item of choice (not listed)	\$250

Requirements:

Turkey trap must be able to hold a turkey inside of device.

Extra Challenge: Design your turkey trap within a budget using the cost list on the side.

Design Process:

ASK: What is the problem you need to solve? Design a device to trap a turkey .

RESEARCH: Research what products or solutions already exist and find technologies that might be adaptable to your needs for the problem that you are trying to solve for Gobbles the Turkey.

IMAGINE: Brainstorm and decide on one idea. How will your device trap a turkey?

PLAN: Draw a picture of the new device. What will your device to trap a turkey look like?

CREATE: Use the materials to create a prototype.

IMPROVE: How can you improve your turkey trap device?

Questions to ask: If you had more choices of materials, what would you use and why? What is the best part of your trap? What was challenging about building your trap?

SAFETY FIRST!



You Must Have Adult Supervision To Complete This Activity.

How do YOU do STEM? Ask your grownup to share with us!

[Facebook.com/DEVCOM.C5ISR](https://www.facebook.com/DEVCOM.C5ISR)



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Fun Joke: What did the turkey say to the computer?

Google, google, google!

STEM in the News

Lightweight Electric Wristband Heaters for Constant, Portable Warm

With colder months approaching, that means having to bundle up in warm sweaters and big winter coats. Some people may pull out heaters, electric blankets, and stock up on handheld heat packets for some extra warmth when going outside. But sometimes sweaters can be too big and bulky and heat packets only temporarily provide warmth.

The American Chemical Society has been researching a way to keep us warmer for longer without having to rely on layers of clothing or multiple amounts of heat packets. They have developed a lightweight electric wristband made of a treated yarn that is durable and conductive and can be recharged and reused. A team of researchers and chemists at the ACM experimented with polymers to treat the yarn to produce a material that kept and retained a warm temperature, did not irritate skin, and could be washed without compromising or breaking the wristband. After multiple attempts and experiments, the team created a safe polymer coating to cover the yarn. The coated pieces of yarn were then braided and sewn together to make the wristband. In addition to all these abilities, the team made the wristband functional by battery with the help of an external circuit to make the wristband more portable.



The ACS is a global leader in promoting science education and providing access to chemistry-related information and research. The organization makes this possible through its research, peer-reviewed journals, conferences, eBooks and their weekly news publication *Chemical & Engineering News*. ACS' mission is to advance the broader chemistry enterprise and its practitioners for the benefit of Earth and all its people. Their mission is to improve people's lives through the transforming power of chemistry.

Sources:

<https://www.acs.org/content/acs/en/pressroom/presspacs/2021/acs-presspac-october-20-2021/lightweight-electric-wristband-heaters-for-constant-portable-warmth.html>

<https://www.sciencenewsforstudents.org/article/explainer-what-are-polymers>

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Facts about Polymers:

- A polymer is a molecule that is made by the joining together of many small molecules called monomers.
- The word polymer is derived from the Greek words "poly" that means many and "mer" that means units.
- The chemical reaction that takes place that bonds the monomers together to make a polymer is called polymerization.
- Some polymers bend and stretch, like rubber and polyester. Others are hard and tough, like epoxies and glass.
- Many proteins in your body are polymers too! Keratin, the stuff your hair and nails are made from, is a polymer.

STEM Activity

Experiment with the Colors of Fall

You can never go wrong with doing a leaf experiment in fall the by getting a chance answer the simple question why do leaves change color? Go outside and enjoy the beautiful colors of fall and collect some leaves to try in this experiment using just a few materials from your home. This experiment will allow you to explore the science behind the gorgeous transformation of leaves.



Materials:

- 3-4 leaves from the same tree (try to find different colors of leaves) or experiment with leaves from different trees
- One clear cup, small bowl or jar for each leaf
- Rubbing alcohol or nail polish remover
- Coffee filters or paper towels
- Spoon
- Scissors
- Tape
- Plastic wrap or plastic baggie
- Hot water (optional) - please make sure to have an adult help you with this
- Flat bowl or dish
- Paper and pencil

Directions:

1. Go outside and collect some leaves. Choose leaves from the same tree but at varying stages of color. Your other option is to experiment with leaves from different trees.
2. Tear or cut the leaves into small pieces and then place the pieces of each leaf into its own cup or small bowl. Be sure to label each cup with what color leaf or what type of tree it came from.
3. Pour the rubbing alcohol or nail polish over into each cup or small bowl. Make sure to pour just enough to cover the leaves.
4. Use a spoon to mix and mash the leaves well until the mixture turns slightly green.
5. Cover your cups or jar with a plastic baggie or plastic wrap and place in a larger dish or bowl and pour hot water around them. Leave in the water for about 20 minutes. Please make sure to have an adult help you with the hot water. You can also try placing your mixtures out in the sun.
6. Cut your coffee filter or paper towel in at least 1 inch wide strips. Place the strips into each one of your mixtures with the top half hanging on the edge of your cup or jar. Use a piece of tape to keep the strips in place.
7. Allow the strips to sit in the leaf mixture for at least an hour. To explore further see what happens if you allow the strips to sit in the mixture overnight.
8. Pull the strips from your mixtures and record your observations.



SAFETY FIRST!

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Complete This

The Science Explained

In this experiment, the rubbing alcohol and the energy (hot water) separated the colors from the leaf mixtures. You may have noticed that the liquid mixture traveled up the coffee filter or paper towel strips and the colors separated as the alcohol evaporated from the strips.

Let's answer the big question: Why do leaves change color? Leaves like all green plants contain chlorophyll. Chlorophyll is a green pigment that traps energy from the sun. It is also a big part of photosynthesis which allows plants to get energy from the sun.

The chlorophyll that gives a leaf the green color tends to be very dominant causing it to hide the other colors in a leaf during the spring and summer. However, in the fall the chlorophyll in leaves breaks down allowing the other natural colors to shine through showing beautiful red, yellow and orange colors.