

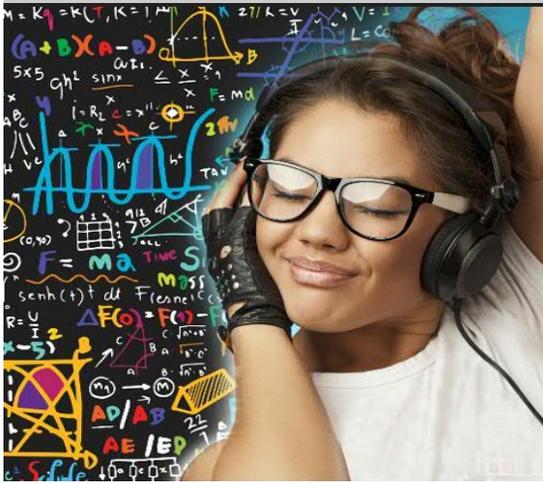


# C5ISR CENTER STEM@Home

## 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 1

## Brain Teaser

# 8,549,176,320

What makes this number unique?

Answer on Page 3

**Welcome Back!!!**  
Join us for another year of amazing  
**STEM@Home.**



## SHARE YOUR STEM!



Visit the C5ISR Center on Facebook to post a photo of your child completing one of the STEM@Home Activities.

**#C5ISRCenterSTEM**

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

# STEM Highlights

## A Summer to Remember

While temperatures rose over the summer, the C5ISR Center Community Outreach office had a chance to work with some amazing students during our Virtual Math and Science Summer Camp. Students participated in a week-long program designed specifically to supplement grade-level STEM learning and to promote interest and engagement.

Students who are entering 5th and 6th grade this year participated in The Great STEM Escape, where they focused on each of the components of the STEM acronym culminating in a virtual escape room. Our rising 7th and 8th grade students focused on STEM in sports and entertainment, and our 9th and 10th grade students dove into the secrets of cryptology. Students met virtually and worked with teachers to complete hands-on STEM projects.

### Highlights of the 5th & 6th grade program

During engineering day, 5th and 6th grade students applied the engineering design process to build a pipe cleaner chair that would support the weight of a stuffed animal.

Tian S. shared her experiences at camp.

“My favorite part of the C5ISR Virtual Summer Camp was the pipe cleaner chair and all the fun interactions with other classmates. One of the things I had to redesign and overcome was at the end, I needed one more pipe cleaner. So I had to find a place on my pipe cleaner chair that was sturdy enough to have one less pipe cleaner. All together, it was a great week, and I look forward to doing this again!”



### Highlight's of the 7th & 8th grade program

Our 7th and 8th grade students created their own mini-golf courses as an example of how machines work.

Hailey S. was particularly pleased with her “Sesame Street” golf course design.

“My favorite part of the Virtual Summer Camp was playing games with the class and creating my mini golf course.”

Just like engineers in the lab, students focused on the need to overcome challenges as a part of the design process.

“Two main challenges I had to overcome during the engineering process were finding different materials around the house to use and, along with the other materials I was provided with, to figure out how to piece them together so that it would fit with my design.”

To find out more about the C5ISR Center Community Outreach Program, visit [https://c5isr.ccdc.army.mil/student\\_programs/](https://c5isr.ccdc.army.mil/student_programs/)

# STEM Challenge

Materials	Cost
Empty bottles	\$300
Plastic fork or spoon	\$180 each
Tape	\$240 for 12 inches
Glue	\$400
Popsicle sticks	\$65 for 15
Straws	\$100 for eight straws
Cardboard	\$550
String	\$150 for 24 inches
Cardboard paper towel roll	\$100
Toothpicks	\$180 for 18
Paper cup	\$200
Paper	\$22
Rubber bands	\$95 for one
Other item not listed	\$295

## Technology Solves Problems!

Technology has changed the way we do so much, from communication to navigation to learning. It can also help solve problems that may pop up in your school or community. With schools starting back in session and communities hosting more events, there is a growing need for new technology that will help the school or community.



### Mission:

You have been contacted by Innovative Solutions Company to design a new piece of technology that can solve or improve a problem in your school or community.

### Requirements:

This new technology should solve a specific problem in your school or community.

### Extra Challenge:

Design your technology within a budget of \$3,000 using the cost list on the side.

## Design Process:

**ASK:** What is the problem you need to solve? What is something in your school or community that you would like to solve or improve?

**RESEARCH:** Research what products or solutions already exist and find technologies that might be adaptable to your needs for the problem that you are solving in your school or community.

**IMAGINE:** Brainstorm and decide on one idea. How will your new technology solve the problem that you have identified?

**PLAN:** Draw a picture of the new technology. What does your invention look like and how does it work?

**CREATE:** Use the materials to create a prototype.

**IMPROVE:** How can you improve your new technology design?

### Questions to ask:

How do you think your new technology will be effective in solving the problem you identified in your school or community?



**SAFETY FIRST! You Must Have Adult Supervision To Complete This Activity.**



Ask an adult to Share your STEM on Facebook.

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

**#C5ISRCenterSTEM**

## Answer from page 1:

The number 8,549,176,320 has every number 0 - 9 in alphabetical order:

**E**ight **F**ive **F**our **N**ine **O**ne **S**even **S**ix **T**hree **T**wo **Z**ero

## STEM IN THE NEWS

### Smart shirt created to monitor the human body

A team at Rice University in Houston, Texas, has been developing a “smart shirt” that has the abilities to monitor your heart rate and track other readings and measurements that are taking place in your body. The shirt is able to take these measurements, like a continual electrocardiogram, due to a conductive nanotube thread that can be woven into a regular shirt or other apparel. This thread is called a nanofiber, and it was first introduced back in 2013 by Professor Matteo Pasquali, a chemical and biomolecular engineer with the Brown School of Engineering at Rice.

Just like regular thread, the nanofiber can be machine-sewn into a garment and is machine washable. Additionally, the fiber is conductive like a metal wire, comfortable, and strong enough to stay intact when the wearer is in motion. During experiments, Pasquali and his team also discovered that the shirt was better at gathering data than a chest-strap monitor and provided better information than an electrocardiogram.

The fiber contains tens of millions of nanotubes that are sewn and woven together into a size that is the same size as regular thread. To ensure an accurate reading, the shirt needs to be “slightly snug against the wearer’s skin,” said Rice graduate student Lauren Taylor. The readings are able to be relayed via Bluetooth to a smartphone or other device. The thread is also being studied for possible use in the heart and brain, and also for cochlear implants. In the future, Taylor foresees other potential uses for the thread. The fibers could also be used in human-machine interfaces, like in automobiles, robotics, or even as health monitors and protection in military uniforms.

“The wearable market is currently relatively small,” said Pasquali. However, he estimates that this could be an entry point for a whole new generation of this type of material.

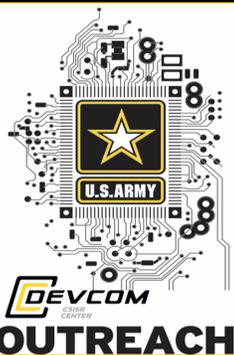


#### Fun Facts About Nano-Fibers

Nanofibers are one hundred times thinner than a strand of human hair, or one billionth of one meter.

#### Sources and Resources:

[news.rice.edu/2021/08/30/smart-shirt-keeps-tabs-on-the-heart/](https://news.rice.edu/2021/08/30/smart-shirt-keeps-tabs-on-the-heart/)  
[www.anandmarket.in/smart-shirt-developed-by-rice-university-researchers-can-monitor-your-heart-accurately/orabrand.com/blogs/blog/what-is-nanofiber](https://www.anandmarket.in/smart-shirt-developed-by-rice-university-researchers-can-monitor-your-heart-accurately/orabrand.com/blogs/blog/what-is-nanofiber)



### 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 educational and extracurricular 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/](https://c5isr.ccdc.army.mil/student_programs/)

## STEM Activity

### Materials:

- Dry erase marker- any color
- A plate, baking dish (glass or ceramic – with a flat surface), or a picture frame that you have permission to write on from an adult.
- Towels
- 1 cup of room-temperature water
- Rubbing alcohol (optional)



**SAFETY FIRST!**  
You Must Have  
Adult  
Supervision To  
Complete This  
Activity.

### Animate Your Drawings

Have you ever dreamed that your little doodles of stick figures, animals, or objects could move around and come alive? In this fun simple experiment, you can animate your drawings using the physical properties of ink and water.



### Directions:

1. Find an area where you have space to work, lay down a towel to protect your work surface, then place your plate or shallow dish on top of it.
2. Using your dry erase marker, draw a stick figure, shape, or message on your plate or baking dish.
3. Use your cup of water to pour just enough water on your plate to cover the dish.
4. Observe. If nothing happens try giving your plate or dish a little shake. What did you notice happen to the ink?
5. Explore with your drawing by trying to pick up your floating creation with your fingers. What happens to it if you pull it out of the water and try to place it back in? What does it feel like?

### How Does This Work?

You should have noticed when you added water to your drawings that they came to life by floating in the water. Unlike permanent markers, dry erase markers contain an ink that is not very adhesive. (Adhesive means when two things stick together.)

A dry erase marker is made up of color pigments, a chemical solvent (alcohol), and a polymer. When water is added to your drawing, the alcohol dissolves, leaving the color pigment and polymer behind on the surface. The smooth surface on your plates makes the pigment and polymer slide right off when it is wet due to the properties of not allowing it to attach.

The ink in the dry erase markers does not dissolve in water, which means that it is insoluble and the reason why it did not disappear. The ink floated because it is less dense than the water, meaning that it is buoyant.



Learn more at <https://www.usaeop.com/program/ecybermission/>

The Army Education Outreach Program (AEOP) eCYBERMISSION registration is open for students, team advisors, and volunteers! eCYBERMISSION is a web-based STEM competition that helps students grades 6-9 learn about real-life applications of STEM. Teams of three or four students are instructed to ask questions or define problems and then construct explanations or design solutions based on identified problems in their community.

- Nov. 15, 2021 – Mini-grant application deadline
- Nov. 23, 2021 - Early registration closes and deadline to receive a free STEM kit (students must be on a team to qualify)