



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 published by the C5ISR Center and 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.



Brain Teaser Activity— Math Sudoku Challenge

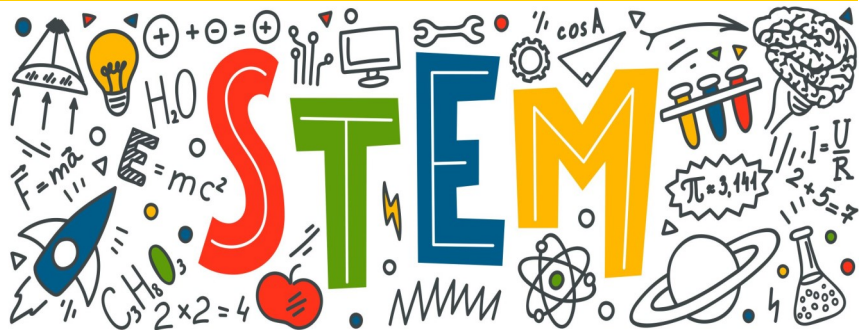
Fill in the puzzle so that every row across, every column down, and every two-by-two box contains the numbers 1 to 4 without repeating any numbers in the row, column, or square.

3			
			1
4		1	
	2		

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Issue 11



SHARE YOUR STEM...

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



<https://www.facebook.com/CCDC.C5ISR/>

#C5ISRCenterSTEM

Introducing Mr. Patrick O'Neill


Name:

Patrick J. O'Neill

Job Title:

U.S. Army Combat Capabilities Development Command (CCDC) Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center, Director

Length of Time as a US Army Engineer:

41 Years

Education:

BS, Mathematics and Computer Science (Double Major), Loyola University, Baltimore, MD,

MS, Computer Science, Johns Hopkins University, Baltimore, MD

MS, National Resource Strategy, Industrial College of the Armed Forces, Washington D.C.

How does your job support the U.S. Soldier? I lead the C5ISR Center, one of the research and development centers in the U.S. Army Combat Capabilities Development Command. The C5ISR Center develops and improves critical technologies that are ultimately used by our Soldiers. The Center works on next-generation technologies that enable our Soldiers to know the enemy and know ourselves. Knowledge is power - and knowledge is enabled by acquiring good, current information. This knowledge gives our Soldiers an edge in combat and allows our Army to stay ahead of our adversaries.

What is a typical day like for you? Busy, but exciting! I'm very fortunate to work with such an incredible workforce that always keeps me on my toes. Even though I'm charged with leading a 2,000-person organization and managing about a billion dollars a year, I feel like I'm constantly learning something new. Most days consist of working with my internal C5ISR team as well as multiple Department of Defense, Army, industry, international, and academic partners to ensure the work we do has maximum impact for our Soldiers.

What drew you to the STEM field originally? I'm generally a curious person, and I love to understand how things work. As a student, I was especially drawn to math and science, so engineering was a perfect fit. Throughout my educational years and professional career, I've found it very satisfying to see my work put into action. There's nothing more enjoyable than seeing a new technology that my Center helped develop or mature out in the field and in the hands of our Soldiers.

Why is STEM important to our national security and our national future? Our adversaries are continuing to develop new technologies, and we must maintain a technical edge to defend against threats. STEM students and professionals are the future!

What subjects should students study to further their interests in a STEM field? All opportunities to further your science and math skills are great. In addition, it's incredibly important for students to engage with others of similar interests. It's one of the best ways to learn and further understand all the possibilities available to students today. On a personal note, I'm an introvert by nature, so outreach activities in general have been incredibly important to me throughout my career.

What is the most important STEM-related innovation you've witnessed in your career? The rise of the internet and wireless communications. With advances in mobile phones, we're able to do things now that were unheard of even a decade ago. Not long ago, streaming video remotely was a real challenge. Now, everybody with a Smart Phone streams video whenever they want!

What is your favorite technology for personal use? My smartphone and several of its apps, like "Waze" to get places and "Find My Friends" so my family can see where everyone is, which is especially nice with my two daughters.

What is the next great technological frontier? I'd say artificial intelligence and machine learning will have a profound impact on our lives. Think of self-driving cars. That is one example of technology that will continue to allow machines to learn, make decisions, and act more autonomously in helping humans complete basic tasks of daily living.

Why is it important for engineers and scientists to engage with STEM outreach activities? It is important for our current engineers to support the next generation. No matter how busy I am, I make time to participate in STEM outreach. One particular activity I've been involved with for several years now is eCYBERMISSION. This forum provides students an excellent opportunity to showcase their talents and engage with other STEM students and professionals. STEM outreach is just one way that we at the C5ISR Center are helping to forge the future.

STEM Activities



New Educational Technology Design

Technology changes the way we do everything, and it can help students learn and teachers instruct. With so many schools around the world incorporating some type of virtual learning, there is a growing need for new technology to support teachers and students.

Mission: You have been contacted by the National Education Council to design a new technology that can support learning in either a classroom or virtual environment. This new piece of technology will help teachers instruct students in a classroom or virtual environment.

Requirements: The technology must be safe for all students to use and effective at improving a teacher’s instruction.

Design Process:

- **ASK:** What is the problem you need to solve? Design a technology that can promote learning and support instruction in a classroom or a virtual environment.
- **IMAGINE:** Brainstorm and decide on one idea. How will your new technology support student learning and teacher instruction?
- **PLAN:** Draw a picture of the new technology. What will your new technology look like?
- **CREATE:** Use the materials to create a prototype.
- **IMPROVE:** How can you improve your new technology design?

Questions to ask:

If you had more choices of materials, what would you use and why?

Recommended

Materials:

- Popsicle sticks
- Straw
- Paper, cardstock, cardboard
- Paper towel roll tubes
- Plastic cups
- Aluminum foil
- Empty water bottles
- Tape
- String or rubber bands
- Fabric
- Paper towel or tissue
- Piece of cardboard
- Index cards

Ask an adult to
Share your STEM
on Facebook.
Use
#C5ISRCenterSTEM



Make Clean Crayons

Directions:

1. Pour one cup of the powdered laundry detergent into a bowl. Slowly add water until a smooth liquid forms.
2. Mix in your food coloring.
3. Pour the mixture into an ice cube tray and let it dry for about two days.
4. Remove from trays and enjoy coloring with your soapy crayons.

How does this work?

The powdered laundry detergent and the water make liquid soap. As the liquid soap dries, it transforms into a solid. If you were to add water back to your soapy crayon, it would become a liquid again.

The crayons made in this experiment are NOT non-toxic. Do not eat.

Materials:

- Food coloring - choose your favorite color
- Water
- Measuring cup
- Ice cube tray
- Small mixing bowl
- Teaspoon
- One cup of powdered laundry detergent



SAFETY NOTICE

Be sure you speak to your grownup **BEFORE** using laundry detergent. This activity should be completed under the supervision of an adult.



STEM in the News

Another Galaxy, Far Away...

Article Sources:

Title: *NASA Missions Explore a 'TIE Fighter' Active Galaxy*

Link: <https://www.nasa.gov/feature/goddard/2020/nasa-missions-explore-a-tie-fighter-active-galaxy>

By: Jeanette Kazmierczak, NASA's Goddard Space Flight Center, Greenbelt, MD, Published Aug. 25, 2020

Title: *NASA finds active galaxy far, far away that looks like a "Star Wars" TIE fighter*

Link: <https://www.cbsnews.com/news/nasa-astronomers-active-galaxy-star-wars-tie-fighter-supermassive-black-hole/>

By: Sophie Lewis, CBS Social Media Producer and Writer, Published Aug. 26, 2020

NASA astronomers and research scientists have discovered an active galaxy that happens to look just like the TIE fighter spacecraft from the Star Wars universe. Galaxy TXS 0128+554, or TXS 0128 for short, is located 500 million light years away from the Earth in a constellation called Cassiopeia, and its discovery has been a process five years in the making. Active galaxies like TXS 0128 produce much more emitted energy than a normal galaxy, such as the Milky Way that contains our solar system.

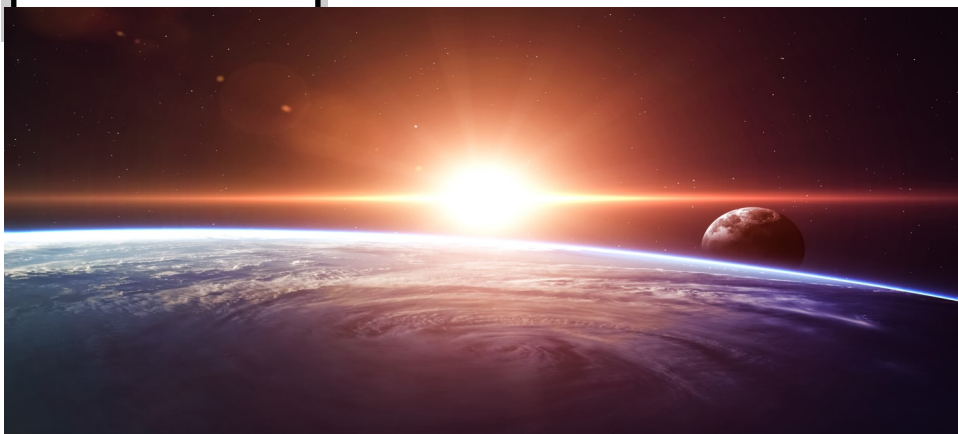
NASA researchers employed a network of telescopes stationed worldwide, including one located at the Goddard Space Flight Center in Greenbelt, Maryland, to view TXS 0128. By using different levels of radio frequencies, they were able to gather enough data and measurements to provide a detailed map of what TXS 0128 looks like. At the center of the active galaxy, TXS 0128 has a supermassive black hole with a mass of about one billion times the size of our Sun.

Researchers were also able to observe that TXS 0128 received its iconic shape due to two things: first, the black hole emits extra energy, which produces particles of gas and dust around its center and travels outward; and second, there were two periods of inactivity where the extra energy was not being produced. Researchers believe this lull in activity caused the galaxy to have "wings" shaped like the ships Darth Vader and the Imperial Starfleet fly in the original trilogy of the Star Wars movies.

Not only was the discovery of TXS 0128 and its likeness to a TIE fighter a "fun surprise," according to Matthew Lister, a professor of physics and astronomy at Purdue University in West Lafayette, Indiana, but it also helped researchers change and improve the way they observe how active galaxies can change over time.

By using different levels of radio frequencies and implementing multi-wavelength observations, NASA was able to look at the galaxy "across a wide range of the electromagnetic spectrum," according to Elizabeth Hays, the Fermi project scientist at NASA's Goddard Space Flight Center in Greenbelt, Maryland. That allows scientists to add a layer to their growing picture of the galaxy, Hays added.

This TIE fighter galaxy joins a Death-Star-shaped rock called Mimas orbiting Saturn and a rock found on Mars shaped like Jabba the Hut.



SOLUTION FROM PAGE 1			
3	1	2	4
2	4	3	1
4	3	1	2
1	2	4	3

Get Your STEM On...

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

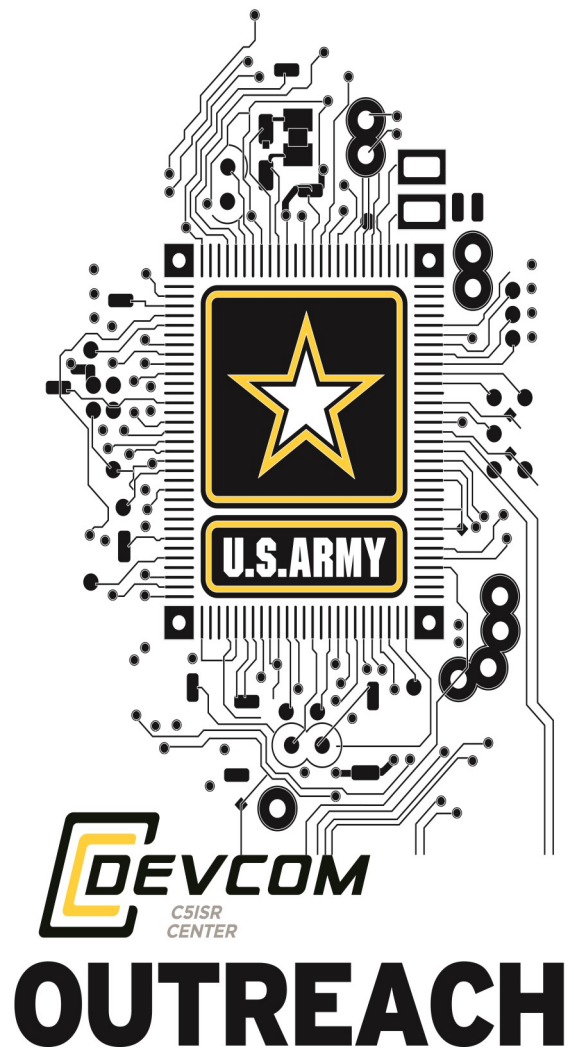
The C5ISR Center Educational Outreach Program is a collection of kindergarten through college-level programs designed to give the students of northeast Maryland and northern Virginia access to educational and extra-curricular opportunities in the areas of Science, Technology, Engineering and Math, or STEM .

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

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

Or, to reach our office, you can email us at:

usarmy.apg.ccdc-c5isr.mbx.outreach@mail.mil



AEOP offers our nation's youth and teachers opportunities for meaningful, real-world STEM experiences, competitions and paid internships alongside Army researchers.

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.

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

The AEOP Research Experiences for STEM Educators and Teachers (RESET) program is accepting applications for the 2020-2021 school year. Selected teachers will participate in online learning as a cohort, with a subset of the cohorts selected to conduct research on-site with an Army scientist or engineer serving as mentor.

Learn more at <https://www.usaeop.com/program/reset/#tab-educators>.