



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.



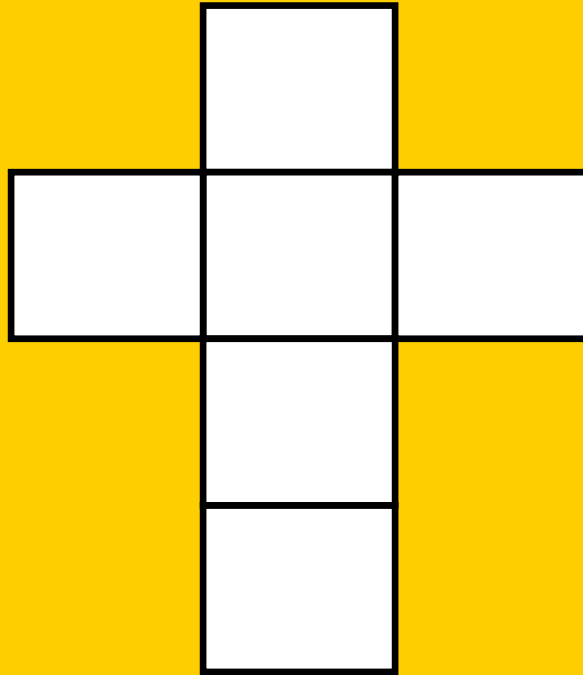
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Issue 25

Brain Teaser: Newton's Crosses Puzzle

Write the numbers 10, 20, 30, 40, 50, and 60 in the correct place so that each line of the cross adds up to 130



Solution on Page 3



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)



Introducing Mr. Evan Derrow



Name:

Mr. Evan Derrow

Job Title:

Strategic Initiatives Officer

Length of Time as an Army Civilian:

8 1/2 years

Education:

Bachelor of Science in Mechanical Engineering, Northwestern University

Master of Science in Systems

Engineering, Johns Hopkins University

How does your job support the U.S. Soldier? As a staff officer, my job is to assist with the operations of the C5ISR Center in a way that allows our engineers, scientists, and other crucial members of the workforce to focus all their time on developing and delivering innovative technologies for our Soldiers.

What is a typical day or a week like for you? The nice thing about my job is that no two days or weeks are alike. I manage a handful of projects at a time, and each can last between 3-6 months. This means that I'm always encountering new problems and figuring out how to solve them in an efficient and effective way.

What drew you to the STEM field originally? Growing up, I always enjoyed solving problems. It's such a great feeling when you can understand what's going on, identify a solution, and see things fit into place. Between that and my passion for completing the biggest and most complex Lego sets I could find, I was destined for engineering school.

Why is STEM important to our national security and our national future? Remember the opening scene of *Harry Potter and the Half-Blood Prince* where the muggle Prime Minister says, "You can do magic! Surely you can sort out anything!" and the Minister for Magic says, "The trouble is, the other side can do magic too"? That's how I feel about why STEM is important to our national security. We have brilliant STEM professionals figuring out new technology, but so do our adversaries. Only through continuous investment in the field can we make sure that our Soldiers are protected.

How should students further their interests in a STEM field? Activities outside the classroom have been far more valuable to my understanding of important concepts than anything else. They helped me see how things work in the real world rather than knowing how long it takes to get to Philadelphia on a train moving at 60 mph. Get involved in extracurricular activities at school, online, at a local community center, or anywhere else that you can use both your hands and your mind to apply STEM principles.

What is the most important STEM-related innovation you've witnessed in your career? The advancements we've made in the speed at which data can be sent, both in terms of hard-wired connections like fiber-optic cables or wireless connections like 5G, has totally reshaped how we design and use technology. A great example is how mobile phones know what the temperature is outside, not because there's a thermometer in the phone, but because that data can be instantly sent to your phone from the nearest weather station. Streaming capabilities like Netflix or Disney+ wouldn't be possible without these advancements.

What is your favorite technology for personal use? I have a special camera in my apartment that lets me check on Wallace, my 4-year-old labradoodle, while I'm at work 35 miles away. I get alerted if he's barking, I can talk to him to calm him down, and I can remotely toss him treats if he's being a good boy. It's really the pinnacle of technology.

What is the next great technological frontier? Advancements in quantum computing will be very exciting. There are certain problems that would currently take a computer years to solve that a quantum computer would be able to do in minutes.

Why is it important for engineers and scientists to engage with STEM Outreach? Every STEM professional's lifetime of work builds on the lifetimes of work that came before them. It's important that we continue to invest in the people that will come after us, and take technologies we design to the next level.

STEM Challenge

Materials:

- Popsicle sticks
- Paper, cardstock, or cardboard
- Plastic bag
- Small plastic cups
- String or rubber bands
- Small paper cups or bowls
- Pipe cleaners
- Straws
- Tape
- Aluminum foil
- Saran wrap
- Bubble wrap
- Other useful items in your home

Let it Rain

Now that it is spring in the town of Baileyville, a lot of rain showers are expected to arrive. Due to a supply shortage, however, there aren't enough rain protection items, such as rain coats and umbrellas, to keep workers and community members dry.

Mission:

The mayor of Baileyville has contacted your engineering company to see if you can quickly design rain protective equipment that will keep his workers and community members dry when it rains. The mayor has requested the rain protective equipment be made portable and will allow his workers to complete their jobs on the highways and in the parks while it is raining.

Requirements:

Rain protective equipment should be easy to use or put on. Equipment should be hands free to allow the workers to perform their jobs.



Design Process:

- **ASK:** What is the problem you need to solve? A way to keep the workers and people in the community dry during upcoming rain storms.
- **IMAGINE:** Brainstorm and decide on one idea. How will you design rain protective equipment that will keep workers and the Baileyville community dry during a rain storm?
- **PLAN:** Draw a picture of your device. What will your rain protective equipment look like?
- **CREATE:** Use the materials to create a prototype of your new design of rain protective equipment.
- **IMPROVE:** How can you improve your rain protective equipment?

Questions to ask:

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

Ask a grownup for permission to use these items.



Ask an adult to Share your STEM on Facebook.

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

#C5ISRCenterSTEM



GET YOUR STEM ON...

The C5ISR Center Community Outreach Program is dedicated to providing quality STEM programs to students K-12. For more information about our STEM Outreach Programs, visit us on the web:

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

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



This is one solution to this puzzle. There are a few.

Keep in mind, with addition, the order of the numbers doesn't matter. In order for your solution to work, it must

	30	
20	50	60
	40	
	10	

include the following:

- 50 must be in the middle
- 20,50,60 must be on the horizontal line
- 10,30,40,50 must be on the vertical line

STEM IN THE NEWS

Recyclable Bioplastic Membrane Developed to Clean Oil Spills in Water

Oil spills cause big problems. They are extremely harmful to oceans and marine life, make seafood unsafe to eat, and cost lots of time and money to clean up. A team of polymer scientists from two different universities in the Netherlands have collaborated to tackle this challenge. Together, they created a fully recyclable superamphiphilic vitrimer epoxy resin membrane that can be used separate water and oil.

Superamphiphilic membranes, meaning a membrane that loves both oil and water, were considered as a solution. However, these membranes are not strong enough to be used outside of the laboratory and the membrane pores can clog up as a result of exposure to sand and algae.

The team, led by Chongan Ye and Katja Loos from the University of Groningen and Vincent Voet and Rudy Folkersma from NHL Stenden University of Applied Sciences, experimented with a relatively new type of polymer to create a membrane that is both strong enough to be used in the real world and easy to recycle. This polymer is a vitrimer plastic. Vitrimers are a type of plastic that can be reused, which makes them a good material to clean up an oil spill.

The polymers in the vitrimer are bonded together and cross-linked in a way that makes the membrane recyclable. It is strong enough to filter out the water from the oil, and when other natural particles found in water clog up the membrane, it is easily broken down into smaller units, or depolymerized, and recreated for future use.

The creation of this membrane shows “the power of cooperation between a research university and an applied university,” said Loos. After the two research groups met, they decided to share research students, staff, and facilities, making them the first hybrid research group in the Netherlands. The formation of the hybrid team made it easier to research and find applications for newly designed materials.

“Polymer scientists and chemists strive to link molecular structures to material properties and applications,” said Voet. By teaming together to combine resources, knowledge, and experience, the research team was able to do just that.



Facts about polymers:

- The word polymer comes from the Greek words “poly,” which means many, and “mer,” which means units.
- A polymer can be defined as something that is made up of two or more molecules joined together to form a long chain. These molecules decide the behavior of that particular polymer. A single polymer molecule is made out of many monomers.
- A monomer is a molecule that can be bonded to other identical molecules to form a polymer.
- A chemical reaction bonding monomers together to make a polymer is called polymerization.

Sources and Resources:

www.sciencedaily.com/releases/2021/03/210309132539.htm

www.noaa.gov/education/resource-collections/ocean-coasts/oil-spills

STEM Activity/Challenge

April Showers Bring May Flowers

As the saying goes, “April showers brings May flowers,” and we are now in our spring rainy season. You can create your own rain in a glass by using a few simple materials from your kitchen.

Materials:

- Glass canning jar or tall glass
- Small ceramic plate
- Pot
- ½ cup of hot water
- 4 ice cubes

Directions:

1. Boil about ½ cup of water in a pan on the stove. Be sure to have an adult’s help with this part.
2. Pour about 2 inches of the hot water into your glass jar.
3. Cover the jar with your small ceramic plate.
4. Set a timer and wait 2 minutes.
5. Place your four ice cubes on the plate.
6. See what happens inside the glass!



SAFETY NOTICE

Make sure you have an adult’s permission and supervision before beginning this activity.



The Science Explained

You should have noticed streaks of water running down the side of the jar, making it “rain.” The ice on top of the small plate caused moisture inside the jar to condense and form water droplets. This is the same process that happens in the atmosphere when it rains. Warm, moist air will rise and meet cold air in the atmosphere, causing water vapor to condense and form participation that falls to the ground. If the raindrops freeze when they fall, they would become snowflakes before they land on the ground.

Resource: spaceplace.nasa.gov/weather-on-other-planets/en/



ARMY EDUCATIONAL
OUTREACH PROGRAM

AEOP offers our nation’s youth and teachers opportunities for meaningful, real-

world STEM experiences, competitions and paid internships alongside Army researchers.

<https://www.usaeop.com/>

