



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 21

Find the Pattern

Look for a pattern to find the value of the “?” in the picture below.

Solution on Page 3



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.

#C5ISRCenterSTEM

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

Introducing Mr. Colin Jones



Name:

Colin Jones

Job Title:

Project Engineer

Length of Time as a U.S. Army Engineer:

2¹/₂ years

Education:

Bachelor of Science in mechanical engineering from Virginia Tech, 2018

Master of Science in mechanical engineering at Johns Hopkins University, in progress

How does your job support the U.S. Soldier? I work for a program office that is responsible for supporting and sustaining several different systems, which are based on aircraft and have sensors that can collect both imagery and radio signals. The program office “owns” these systems, so we are responsible for fixing them if anything goes wrong and for upgrading them as Soldiers’ mission requirements change.

What is a typical day or a week like for you? A typical week involves interacting with the user community, such as Soldiers; reviewing equipment failure data; participating in a variety of meetings, ranging from engineering meetings to meetings focusing more on how program money is being budgeted and spent; and interacting with other functional areas like logistics, business, and contracting to solve problems.

What drew you to the field originally? In high school, I enjoyed math and science classes, so I decided to pursue an engineering degree in college. Math and science can be applied to almost any real-world problem. The information you learn in those classes can help develop important problem-solving skills and processes.

Why is STEM important to our national security and our national future? STEM is important to national security because the world and technology are rapidly changing. More and more complex systems are being developed, and in order to sustain them going forward, we will need a workforce well-educated in the STEM fields and that is familiar with the technology.

How should students further their interests in a STEM field? If students are interested in a STEM field, typically middle schools and high schools have after-school programs or clubs related to STEM – for example, robotics clubs, machine shop, engineering clubs, etc. Also, local colleges and universities typically have summer and winter programs/camps that are made for younger students who are interested in learning more about STEM fields. I am from North Carolina and attended a similar summer program at N.C. State University when I was in high school.

What is the most important STEM-related innovation you’ve witnessed in your career? Considering that I am still pretty early into my career, I am going to expand this question to cover the most important STEM-related innovation over the course of my lifetime. I would say without a doubt, the answer to that question would be the internet, or the World Wide Web. Over the past few decades, the internet has changed how people communicate, how businesses operate, and how education is structured. I think the internet is going to be around/part of our lives for a long time going forward.

What is your favorite technology for personal use? I enjoy photography so I would say my cameras. I have a couple of different types, both digital and film, but lately I have been taking black-and-white photographs with an older technology, 35mm film.

What is the next great technological frontier? One of the technologies that seems to have gotten big over the past decade or so is artificial intelligence, or AI. AI is basically intelligence for machines (think robots) and allows machines to “learn” from data and become very good at performing specific tasks. The Army has begun incorporating AI into many of their systems.

Why is it important for engineers, scientists, and analysts to engage with STEM Outreach? It is important for current engineers and scientists to engage with STEM Outreach because engineers/scientists working in the real world are able to speak to problems they encounter/solve on a daily basis and can help spark interest and answer questions that future engineers/scientists may have.

STEM Challenge



Materials:

- Popsicle sticks
- Paper, cardstock, or card-board
- Paper towel roll tubes
- Small plastic cups
- Plastic bottles
- Aluminum foil
- String or rubber bands
- Small paper cups or bowls
- Pipe cleaners
- Straws
- Tape
- Plastic spoons
- Other useful items in your home

Special Delivery

The mayor of Baileyville wants to send a Valentine’s Day surprise to all the children in town. Unfortunately, the post office has become very backed-up, and she is worried her cards won’t get to the children in time.

Mission:

The mayor of Baileyville has contacted your engineering company to design a device that will deliver Valentine cards and gifts to those in the local community. The device can be something that flies or something that operates on the ground as long as it delivers gifts and cards on time to the recipient.

Design Process:

ASK: What is the problem you need to solve? A way to deliver cards and gifts to people in the town of Baileyville.

IMAGINE: Brainstorm and decide on one idea. How will you design a device to deliver cards and gifts?

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

CREATE: Use the materials to create a prototype of your delivery device.

IMPROVE: Use materials to test your delivery device. How can you improve your delivery device?

Questions to ask:

- If you had more choices of materials, what would you use and why?
- How will your design be effective in delivery cards and gifts to their recipients?



Ask a grownup for permission to use these items.

Ask an adult to Share your STEM on Facebook.



#C5ISRCenterSTEM

COME & 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.



A Sweetheart of a Riddle:

Q: What type of shape is most popular on Valentine's Day?

A: Acute triangle.

SOLUTION TO PUZZLE ON PAGE 1

$$? = 8$$

Explanation: The diagonal values are cubes and cube roots

STEM IN THE NEWS



New Discoveries About Saturn

Scientists, astronomers, and astronauts continue to explore and learn more about our solar system each and every day. A research team from the French National Centre of Scientific Research and the Institute of Celestial Mechanics and Ephemeris Calculation have been studying the planet Saturn and recently discovered more about the gas giant.

Saturn is tilted on its axis, just like the Earth is tilted on its axis. This tilt, both for Earth and Saturn, is caused by the movement and the gravitational forces of the sun, moons, and other neighboring planets. In the case of Saturn, the planet's many moons have more of an impact on the planet's axial tilt than previously known.

Saturn has a total of 82 moons, which consists of 59 moons, also called satellites, that we know of and an additional 29 moons awaiting confirmation of existence. The planet's largest moon, Titan, and other moons have been recently observed to be moving away from the planet faster than previously estimated. This increased migration rate, when incorporated into scientists' and astronomers' calculations, have shown that as the satellites move further away, the planet's tilt on its axis increases more and more.

The event that resulted in Saturn's tilted axis is estimated to have occurred relatively recently. For more than three billion years after the planet's formation, its axis was only slightly tilted. It has only been in the last billion years that the rate of migration of Titan and Saturn's other moons increased. This increased migration rate caused Saturn's orbit to interact with the path of the planet Neptune. This resulted in Saturn's tilted axis and the planet's observed current inclination of 27 degrees.

These new findings challenged previous theories and scenarios about planets' tilts. Scientists already understood that the interaction of Saturn and Neptune, a phenomena called orbital resonance, influenced the change in Saturn's axis, and that after this event, Saturn's axis would remain stable. However, this new research shows we are currently witnessing a transitional period in this shift, and that Saturn's is still tilting. In the next few billion years, the tilt of Saturn's axis could more than double.

Sources:

www.sciencedaily.com/releases/2021/01/210121132103.htm
spaceplace.nasa.gov/all-about-saturn/en/
solarsystem.nasa.gov/planets/saturn/overview/

Out of This World Facts About Saturn:

There have been four missions to Saturn. Pioneer 11 and the twin Voyager 1 and Voyager 2 crafts have made flybys, and Cassini and the Huygens Probe entered its orbit.



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

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STEM Activity/Challenge

Materials:

Materials:

- 3 clear cups or empty water bottle
- Candy conversation hearts
- ½ cup of water
- ½ cup of vinegar
- ½ cup of oil
- Small pieces of paper and pencil

SAFETY NOTICE

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



Try This!

Test other liquids such as soda, hydrogen peroxide, soap, hand sanitizer, milk, juice, or corn syrup, or change the temperature of your water to see what dissolves the candy hearts best.

Q What did the calculator say to the pencil on Valentine's Day?

A. You can always count on me!

Candy Heart Science

With Valentine's Day just around the corner, you are likely to see candy conversation hearts, and you may just receive some of your own as a gift. Try this fun science experiment exploring solubility by dissolving your candy hearts using just a few items from your kitchen.



Directions:

1. Fill your 3 cups or bottles with your liquids (water, vinegar, soda) making sure you use the same amount in each container.
2. Label each of your cups with what liquid you placed in it.
3. Take a moment to make a hypothesis, or prediction, of what will happen in each of your liquids.
4. Will your candy heart sink or float?
5. What will happen when you place the candy heart in each of the liquids?
6. Which liquid is a better solvent for dissolving the candy heart?
7. Drop 1-2 candy hearts in each of the liquids.
8. Observe what happens when you first place the candy hearts in each container. Then set a timer for 15 minutes and come back and make observations again.
9. What did you notice?
10. Which liquid is a better solvent for dissolving the candy heart?
11. Was your prediction correct?

The Science Explained

Solubility refers to how well something can dissolve in a solvent. This experiment focuses on testing solubility of a solid in a liquid, but you can actually test solubility of a solid, liquid or gas.

The candy heart will dissolve in the water because the water attracts the sugary solid. In order for a liquid to dissolve a solid, the molecules of the liquid and solid must attract each other. A water molecule has powerful magnetic properties because of the two positive charged hydrogen atoms that are attached to a negative oxygen atom. Polar water molecules attract to the negative and positive sugar molecule, which makes sugar dissolve in water. To speed up the process of the candy heart dissolving in the water, you can increase the temperature of the water. Sugar will dissolve faster in hot water than cold water because when water is heated, the molecules gain energy and move around faster.