

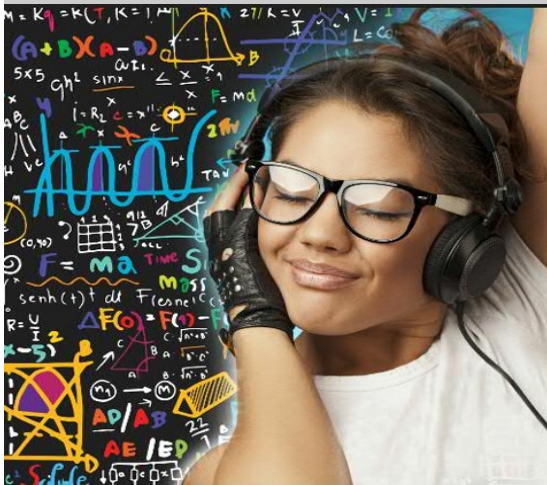


C5ISR CENTER STEM@Home

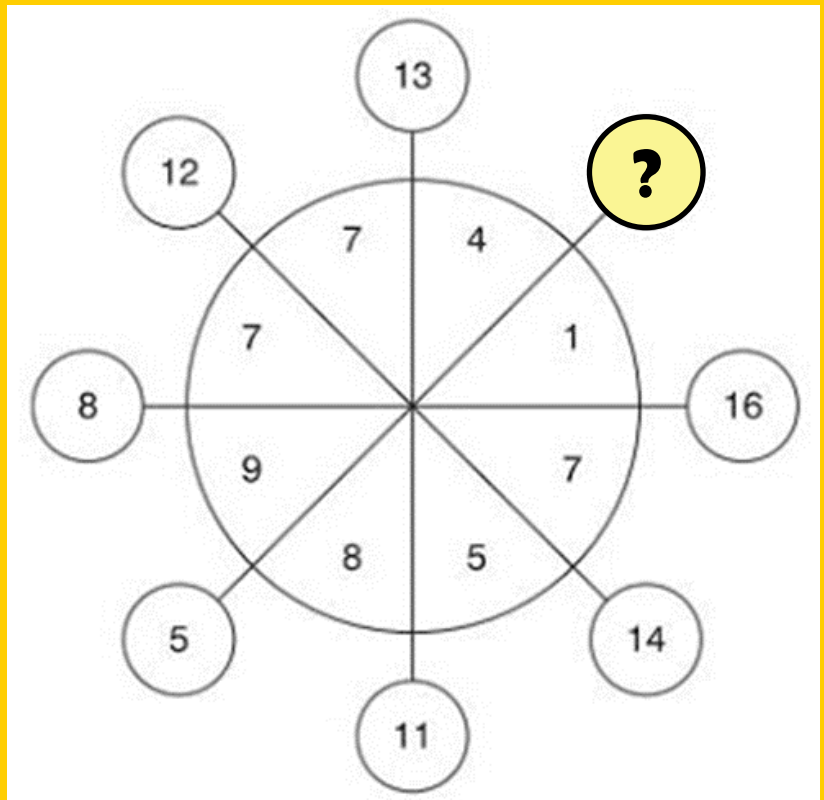
Welcome to STEM@Home!

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.



Brain Teaser: Solve the pattern puzzle below. Find the missing number to replace the question mark.

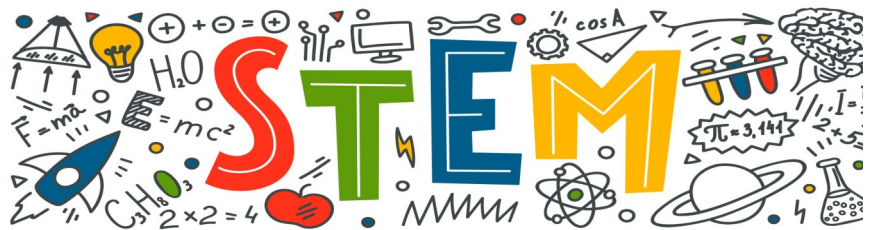


Solution on Page 3

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Issue 17



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 Ms. Alliana Warner



Name:

Alliana Warner

Job Title:

Mechanical Engineer

Length of Time as a U.S.

Army Engineer:

1 ¹/₂ Years

Education:

Bachelor's of Science in
Mechanical Engineering,
University of Maryland,
Baltimore County

How does your job support the U.S. Soldier? My job helps to develop cameras that aid Soldiers when they drive at night and also helps to develop cameras that enable Soldiers to see what is around their vehicle when dismounting. This provides valuable information that allows Soldiers to see more of the battlefield to make faster decisions to keep their squads safe.

What is a typical day like for you? Right now, our team is mostly working from home due to COVID-19. A typical day involves logging onto my laptop, writing emails, and participating in meetings on Microsoft Teams. However, when I go onsite, I get to work with our computer and sensor technology. When that happens, the day mostly consists of me setting up cables, configuring sensor equipment, and troubleshooting any issues the integration team experiences that day. This past year, my team traveled to Colorado, Arizona, and a few other places to participate in field tests. These tests allow Soldiers to gain firsthand experience with the new technology and give feedback on their experience. These tests provide valuable feedback for us as we continue to design and develop technology that is useful and meets the Soldier's needs.

What drew you to the STEM field originally? When I was in 5th grade, I was given materials and instructions to get a marble from one side of the room into a cup on the other side. My team and I used foam tubes, tape, chairs, tables and anything else in the classroom to make a rollercoaster track for the marble to travel through, and we finished with the marble landing in the cup. The process was so much fun. I enjoyed the hands-on problem solving and the collaboration with my peers as we built a workable solution. This really opened my world to engineering as a whole. I choose to study mechanical engineering because of its expansive reach. There were so many industries I could move into with a mechanical engineering degree, and at the time, I didn't know which field I wanted, so I chose one with a lot of options.

Why is STEM important to our national security and our national future? STEM is very important to our national security and our national future. It is important that our Soldiers have the equipment needed to not only stay safe but to ensure they are in the best possible position to accomplish their mission and return to their families.

How should students further their interests in a STEM field? I would recommend reaching out to your science and math teachers. A lot of schools have resources and after-school programs that are a lot of fun. I know with COVID-19, there are a lot of programs that are now virtual. YouTube has a lot of great science and engineering experiments to try out. Also, learning to code would be a great skill to have. The Hour of Code hosted by code.org is a great opportunity to learn some programming skills. If you are looking for something that is a little more hands-on, Lego has Mindstorm kits, which are robots that you build and program. I did a lot of robotics in high school. Also, 4H is another great program to connect with. In 4H, youth build leadership and life skills by working on projects that range from woodworking, robotics, and cooking, to public speaking.

What is the most important STEM-related innovation you've witnessed in your career? I think that the most important innovation I have seen is the Integrated Visual Augmentation System. It is a headset that allows Soldiers to use augmented reality to do simulation training.

What is your favorite technology for personal use? My favorite technology for personal use would probably be my cell phone. I love to stay in touch with people, and I really enjoy taking pictures.

What is the next great technological frontier? A lot of people at work are looking into machine learning. There is a lot of research and great learning to be done in that area.

Why is it important for engineers and scientists to engage with STEM Outreach? Engineers and scientists can be role models and mentors to younger students and aspiring engineers and scientists. It is really important for us to participate in STEM Outreach by sharing our experiences and stories. In STEM, there are so many opportunities, and there are also lots of needs. We need more people from all different backgrounds to bring fresh ideas to make solutions that are inclusive, equitable, and truly meet the customer's needs.

STEM Activity/Challenge

MATERIALS:

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

A “Sweet” Riddle...

Q: What type of candy is never on time?

A: Choco-late

Candy Grabber Challenge

The machines at a local candy factory broke down, causing candy to spill all over the floor. To avoid contamination, workers have been told not to pick up the candy by hand. The candy company is in search of a device that will allow workers to pick up the candy quickly and place it in the correct packaging without using their hands.

Mission:

Your engineering company has been selected to design a device that can pick up multiple pieces of candy at once to allow the workers to quickly place the candy in packages so it can be distributed to stores in time for the upcoming holiday season.

Design Process:

ASK: What is the problem you need to solve? Design a candy grabber that can pick up candy, allowing factory workers to put them in packages quickly without using their hands.

IMAGINE: Brainstorm and decide on one idea. How will your candy grabber pick up candy?

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

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

IMPROVE: How can you improve your candy grabber?

⇒ **Questions to ask:**

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

⇒ How will your design be effective in allowing the workers to quickly pick up the candy in the factory?



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



The C5ISR Center Community Outreach Office

The C5ISR Center Community Outreach Office is pleased to announce our new portfolio of virtual programs for students grades K-12.

Programs for January 2021:

- STEM Story Hour (Grades K-2) - January 13th at 5:00 pm
- Middle School STEM Night (Grades 6-9) - January 19th at 5:00 p.m.
- High School Seminar (Grades 9-12) - January 28th at 5:00 p.m.

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

<https://usarmyc5isrcenter.submit.com>

Solution to Puzzle on Page 1: The missing number is 17. Each number in the circle is the sum of the numbers in the opposite quadrant. In this case, the numbers are eight and nine, which added together makes 17.

STEM IN THE NEWS

Did you know?

Auroras are not just something that happen on Earth. If a planet has an atmosphere and magnetic field, it can have auroras. In addition to Earth, auroras have also taken place on Saturn and Jupiter!

Sources:

<https://www.washingtonpost.com/weather/2020/11/23/arctic-alaska-northern-lights-aurora/>

<https://spaceplace.nasa.gov/aurora/en/>

<https://www.northernlightscentre.ca/northernlights.html>

The Northern Lights Dazzle Across the Night Sky

On Saturday, Nov. 21, the residents of Fairbanks, Alaska were treated to a beautiful display of lights and colors that only comes around roughly every 11 years. Aurora borealis, or the northern lights, could be seen after the sun set at 3:23 p.m. local time, and they demonstrated displays of colors – varying from emerald and yellowish green to purple and violet – that shimmered and danced across the evening sky.

Aurora borealis, which translates to “dawn of the north,” are lights caused by collisions between electrically charged particles from the sun and gaseous particles within the Earth’s atmosphere. The particles burst from the sun’s surface and hurtle toward the Earth. The sun is always emitting and sending energy and small particles our way, but the Earth has a protective magnetic field that shields us from these particles, so we don’t normally notice them.

The event that took place on Nov. 21, however, was not a normal occurrence. The sun doesn’t send the same amount of energy each time the northern lights appear. In this instance, there wasn’t just one burst of energy, but rather, the particles were charged with electromagnetic radiation and sent with a steady stream of solar wind, which allowed them to enter into the magnetic field that surrounds the Earth. From there, they interacted with the gases in our atmosphere and were converted into the harmless, beautiful lights we see glimmering through the sky. The different colors we see for the northern lights are due to the type of gas particles colliding in the atmosphere. Oxygen produces the green light, and sometimes even red, while nitrogen glows purple and blue.

The lights in Fairbanks were also accompanied by rare “light pillars,” which are vertical columns of light that take shape in extremely cold temperatures as hexagonal ice crystals form lower in the Earth’s atmosphere than typical.

Not only were the lights visible in Fairbanks, but they could also be seen as far south as northern Minnesota and Wyoming. The aurora was also visible in the northern United Kingdom, Norway, Sweden, Finland, and Iceland.

The northern Lights are cyclic, which means they occur during the peak of the solar cycle, which lasts approximately every 11 years. When the cycle is in full gear, discolorations on the sun, called sunspots, are at their maximum and cause the solar wind to send particles and energy into the Earth’s atmosphere. Oddly enough, the cycle is currently in a solar minimum, which means the sun has longer periods of time without sunspots. This makes auroras and phenomena like the northern lights less likely to occur. However, the sky can still treat us to a dazzling display of beauty and science.



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. **ACCEPT THE CHALLENGE TODAY!**

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

STEM Activity/Challenge

Materials:

- Shallow dish or bowl
- Small dish (big enough to hold some dish soap)
- Food coloring (blue, green, purple, yellow)
- Cotton swabs
- Dish soap
- Milk (whole milk works best)

Create the Northern Lights

It is said that one of the best times of the year to see the northern lights in Alaska is during the winter. The northern lights create an aurora of beautiful natural lights in the sky that look like they are dancing. With just a few ingredients from your kitchen, you can create your own display of the northern lights.



Directions:

1. Pour about $\frac{1}{4}$ cup of milk into your shallow dish or bowl or until you have a thin layer of milk in it.
2. Put some dish soap into your small dish and set it aside.
3. Add drops of food coloring all around in the milk. To obtain the colors of the northern lights, you will want to use mostly green and blue food coloring, with a few other colors. Add at least 3-4 drops of each color.
4. Dip your cotton swab into the dish soap, then gently place it on the surface of the milk. Watch with amazement as the colors dance across the surface of the milk just like the northern lights in the sky.

Experiment Further:

Try the experiment again using milk with different fat percentages. You could try skim milk, 1% milk, 2% milk, whole milk, buttermilk, cream, or even half-and-half milk.



SAFETY NOTICE

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

The Science Explained:

This simple experiment allows you to study the effect fat content has on the movement of colors when dish soap is added. The big key to the dancing colors in this experiment is the soap. Soap molecules consist of two different ends. One end is hydrophobic, meaning water fearing, and one end is hydrophilic, meaning water loving.

Milk is made up of minerals, proteins, and fats. Proteins and fats can be susceptible to changes, and fats cannot dissolve in water. When the dish soap is added to the milk, it separates the water and fat in the milk. The hydrophobic end of the soap molecule breaks up the non-polar fat molecules, and the hydrophilic end is attracted to the water. When the soap molecules attach to the fat molecules in the milk, it allows the non-polar fat molecules to be carried by the water molecules. This process would normally be invisible to you, but the food coloring allows you to see all the movement taking place.

The pushing and pulling of the fat molecules in the milk results in an explosion of color. When the soap becomes evenly mixed with the milk, the action will slow down and eventually stop. To see if there are more fat molecules, add more soap to milk. If there are fat molecules still, the color explosion will start again.

Resource: steampoweredfamily.com/activities/galaxy-magic-milk-experiment