



U.S. ARMY



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CENTER

STEM@Home

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Welcome to STEM@Home!

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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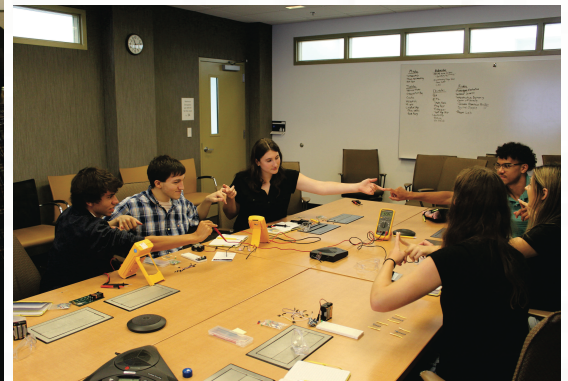
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Welcome Back!!!
Join us for another year of amazing STEM@HOME

Math Corner

Josh earned \$25.00 one week for shoveling snow and \$50.00 for the next week. He then gave $\frac{2}{5}$ of his earnings to his little sister for helping him. How much money did he give to his little sister?

Answer & Explanation on Page 8



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C5ISR Center Spotlight

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Jean Robert Brutus Jr.



Job Title: Lead Systems Engineer; 15 years,
Civilian

Education: Bachelor of Engineering, Electrical
Engineering, Stony Brook University
Master of Engineering, Systems Engineering, Stevens
Institute of Technology

1. What is your job and how does it support the U.S. Soldier?

As a Lead Systems Engineer, I help design and architect Artificial Intelligence (AI), and a variety of other computer based technological programs for the Army. My team and I meet with different groups of Soldiers who are looking for ways to alleviate the amount of work and time required to sift through the vast amount of data and information that are available to them. The hope is that the work we do will deliver trusted AI models to Soldiers, making their lives easier and allowing them to quickly extract relevant information and gain valuable insight to share with their commanders for awareness and actions.

2. What drew you to the STEM field originally?

I was born and raised in Haiti, where both of my parents were doctors. Growing up, I saw first-hand how such a career contributes to saving lives. They inspired me to have an impactful career as well. Unfortunately, I am one of the many people who feel uneasy at the sight of blood, and I realized very quickly that being a doctor wouldn't be a great fit for me. When computers became readily available to me in late 1990s, I was eager to learn more about how they operated. I learned how to troubleshoot and fix issues as they arose and decided I would study computer science. During my first year in college, I found out that I did not enjoy programming as much as I expected and started to think of new avenues within the engineering field. In Haiti, electricity was scarce (still is), and we often had to do without.

C5ISR Center Spotlight

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Jean Robert Brutus Jr., cont'd

Seeing the different lifestyle here in the United States and how electricity was paramount to everyday lives, sparked a new interest in me. And I started exploring a degree in electrical engineering. I knew a few friends who were pursuing that same degree, and they encouraged me to switch my major, which I did and never looked back. The dream was that one day my contribution would help make the world a better place for some. Although in my current position I do not do a lot related to electrical engineering, but here and there, understanding when vendors talk about the power requirements for their computers/servers makes me smile.

3. What is the most important STEM related innovation you've witnessed in your career?

As a kid, I always dreamed about flying cars to avoid traffic. I never envisioned that one day, cars would be able to drive themselves from one location to another with minimal to no inputs from a human. I think that a self-driving car is a fascinating STEM related innovation, especially since I learned to drive using a car with a manual transmission (stick shift). When you drive a car with a manual transmission, you choose which gear to use and when to shift to another gear. You must constantly use both feet and both hands to stay in control of the car when driving. Nowadays, driving a car can have a whole different meaning and maybe soon enough, I will be able to finally have my flying car.

4. Why is STEM important to our national security and our national future?

For the world to be livable, all fields of study are needed in the community as they each contribute something specific to someone's life. STEM is especially important to our national security and our national future because it drives creativity and innovation. STEM allow us to come up with newer and more efficient ways to support our Soldiers and protect our country.

5. What should students be engaging in to further their interests in a STEM field?

I would encourage students to try their hands at different elective classes early on. Participate in different clubs in school if available, attend STEM camps and local community STEM activities when offered. Do not be afraid to explore the STEM field in fear of it being too hard. Life is not always easy. Take the hard road early on, explore, be open minded. And if or when you fail, do not give up, keep going. Your hard work and perseverance will pay off. You are more capable than you think, and you can do wonders.

STEM In The News

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Matter Changing Robot

When thinking of robots, one fact that comes to mind is that they are made from hard material or technology (metal or plastic); their bodies cannot be easily broken down. While material such as metal or plastic takes years to break down, a team of scientists have defied those odds by creating a robot that not only transitions from a solid to a liquid state seamlessly, but also morphs back to its original solid state from a liquid.

On January 25, 2023, a video was released by scientists from The University of Hong Kong showing an 11-millimeter humanoid robot “escaping” a cage by melting into a liquid, trickling out between the bars, and then reforming back into its original solid form. Scientists built the robot with microscopic magnetic particles and encased the robot in a gallium mold, a soft, silvery-white metal, similar to aluminum. “The soft metal has a very low melting point of 85.64 °F” (29.8 °C) says Chengfeng Pan, lead scientist of the project. “When exposed to an alternating magnetic field, the tiny particles inside the robot heat up and melt the gallium. We then used a more focused magnetic field which allowed us to guide the liquid metal to its destination. Once the gallium cools, it hardens and forms back into its original state. This process resulted in the robot returning to its original form.”

Robots are often thought to be solid machines. Through this experiment, scientists have given robots the ability to take on many different forms which endows them with more functionality. While these shapeshifting robots can be useful in many fields, researchers believe that they will be most useful in the biomedical field, assisting in critical procedures and surgeries.

To read the full article visit:

<https://www.insider.com/video-scientists-robot-changes-from-liquid-to-solid-2023-1>

Resources:

Al-Arshani, Sarah. “Video: A Team of Researchers Made a Shape-Shifting Robot That Can Switch between Liquid and Solid - Signaling a New Breakthrough in Robotics, Study Says.” Insider, 29 Jan 2023.

www.insider.com/video-scientists-robot-changes-from-liquid-to-solid-2023-1.

Dolasia, Kavi. “Shape-Shifting Robot Melts to Escape ‘Prison Cell.’” DOGOnews, 25 Aug 2023. www.dogonews.com/2023/1/31/shape-shifting-robot-melts-to-escape-prison-cell.



STEM Challenge

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Snow Scoop Challenge



It's 2024 and local meteorologists have predicted that this will be the year of blizzards. You and your family decide to start planning for this predicted blizzard. But when you go out to buy snow shovels, you soon realize that all stores are sold out. Why? While it has almost been 14 years since Maryland has seen a big snowstorm, many Maryland businesses and residents are not taking chances. They are gearing up for Snowmageddon 2024. All stores in the surrounding area have sold out of snow shovels. Your family is in desperate need of a shovel, so what do you do?

Mission: Build your own snow shovel using the materials listed below. Construct a shovel that can move snow and operate using only two fingers on one hand.

Requirements:

- Only use the materials list.
- The shovel must be able to scoop up the snow and discard it. You cannot use the shovel to brush away the snow.
- The shovel must be able to clear away most of the snow to successfully complete this mission.

Materials to make the shovel:

- White rice (snow)
- Tray or baking sheet (surface for the snow)
- Plastic straws
- Tape
- Paper
- Clothes pins
- Popsicle sticks
- Index cards

STEM Challenge

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Snow Scoop Challenge cont...,

Design Process:

Ask: What needs to be accomplished? Build a snow shovel that is strong enough to move snow (white rice) and can operate using only two fingers on one hand.

Plan: Draw the structure of your shovel. Ask yourself, how will I construct my shovel to be sturdy and get the job done?

Create: Begin your build. How will you construct the shovel, so it will not easily break and hold a fair amount of snow.

Improve: Test your shovel several times by shoveling different amounts of snow. Adjust the structure of your shovel as needed. The goal is to remove as much snow as possible, only shoveling a few times. Ask yourself what do I need to do differently? What other strategies will I try if my first design does not work as planned?

Questions to Ask: What kind of structure would I have to make to achieve my goal? How can I construct my shovel in a way that will remove the most amount of snow?

Fun Fact:

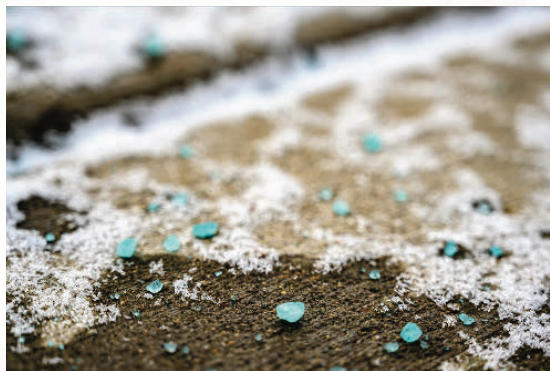
The earliest known snow shovel is estimated to be 6,000 years old and made from carved elk antler tied to a wooden bone handle.



STEM Activity

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Salt & Ice



During the winter there is a chance of freezing rain and ice. While snow shovel sales go up during this time of year, the demand for salt also goes up. Besides heat, salt is one of the leading elements that can easily break down frozen water. But what about other elements such as sugar, baking soda, baking powder, vinegar or pepper. In this fun experiment, you will be able to test if these elements can also liquefy frozen water.

Materials:

- Six small Dixie cups
- Water
- Hot water
- Cold water
- Scissors
- Muffin tin with six compartments
- Salt
- Sugar
- Baking soda
- Baking powder
- Vinegar
- Pepper

Directions:

1. Before beginning, predict what will happen. What variable will melt the ice faster?
2. Fill six small Dixie cups with water and place them in the freezer.
3. Freeze overnight.
4. Cut the frozen water out of the paper cups (Adult supervision is required).
5. Place one ice cube in each compartment of the muffin tin.
6. Pour hot water on to one cube then cold water, salt sugar, baking soda, baking powder, vinegar and pepper on each of the remaining cubes.
7. Leave alone for a few minutes.
8. Observe what happens.

STEM Activity

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Salt & Ice cont...,

Science Explained:

Why does salt melt snow? It is commonly known that salt can melt ice and can also prevent ice from forming. This is because salt lowers the freezing point of water. When water becomes frozen, the molecules slow down and begin to settle together into tight bonds. When salt is applied, it dissolves into two separate ions: sodium chloride. These ions disrupt the bonds between water molecules. As the ions loosen the hydrogen bonds, the bonds begin to actively move and separate, melting the ice into water.

References:

Smart, Salt. "How Does Salt Melt Snow and Ice?" Salt Smart Collaborative, 16 Feb 2022. saltsmart.org/how-does-salt-melt-snow-and-ice/.

Fun Fact:

Ice is a unique substance because its solid state is less dense than its liquid state.



Answer:

He gave his sister \$30.00.

Answer explained:

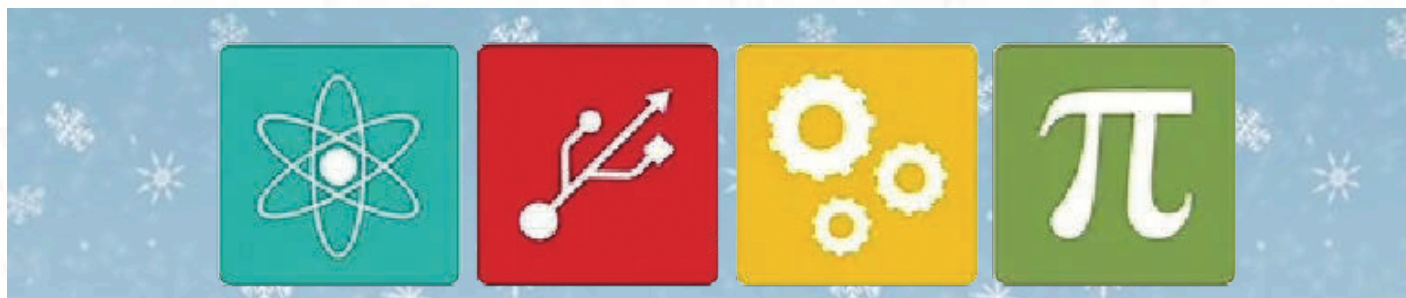
He earned $\$25.00 + \$50.00 = \$75.00$ total.

$$75 \times 2 = 150$$

$$150 \div 5 = 30$$

Ready – Set – STEM

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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 in the northeastern region of Maryland and Northern Virginia 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 at:
<https://c5isrcenter.devcom.army.mil/studentprograms/>

To reach our office, you can email us at:
usarmy.apg.devcom-c5isr.mbx.outreach@army.mil

The Army Education Outreach Program (AEOP) CYBERMISSION registration is open for students, team advisors and volunteers! eCYBERMISSION is a web-based STEM competition that helps students in grades six to nine 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/>



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Outreach Thank You(s)

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Thank You

The C5ISR Center Community Outreach Office would like to take the time to thank our volunteers who supported our programs throughout the month of December.