

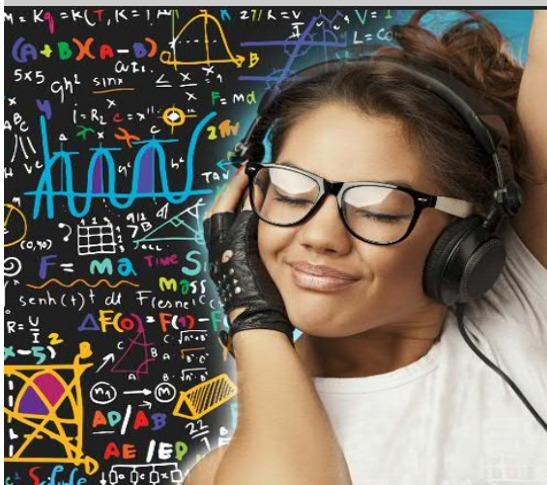


Approved for Public Release

STEM@Home Volume 3 Issue 6

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. To learn more about C5ISR Center Community Outreach, visit [C5ISR Center U.S.ARMY CCDC | Student Programs Overview](#)



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Math Moment:

The average resting heart rate for a child between 1 and 3 years old is 70 – 110 beats per minute. By age 12, it should be 55 – 85 beats per minute. For an adult, the average is 60 – 100 beats per minute.



When people exercise, their heart beats faster. You can calculate the “best” heart rate for yourself during exercise by using the formula below. Take 220 and subtract your age. That is your maximum heart rate. Then, use that number to calculate your minimum and maximum heart rate levels for exercise.

FIRST: $220 - (\text{your age}) = \text{maximum heart rate}$

THEN: $\text{Maximum heart rate} * (.60) = \text{good exercise level}$

OR

$\text{Maximum heart rate} * (.80) = \text{intense exercise level}$

For best heart health, you shouldn't be above the 80% level. Try this: calculate your resting heart rate (while sitting on the couch). Then, run around the backyard or neighborhood a bit. Next, calculate your active heart rate. Compare that to your calculations above.

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

STEM Programming at CYS

Holly Nathaniel

Virtual STEM Story Hour

- Gary Micah

If you would like to participate in the C5ISR Center Outreach Program, register at:

<https://submit.link/Fe>



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

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

SME Feature



Ryan Manning

Student Trainee

Number of Years:

I have been a student trainee for 3 years while in school for 2 different organizations.

Education:

Bachelor of Science, Embry-Riddle Aeronautical University, Aerospace Engineering with concentration in Astronautics, graduated May 2021

Master of Science, Embry-Riddle Aeronautical University, Aerospace Engineering with concentration in Structures and Materials, will graduate May 2023.

1) What is your job and how does it support the US soldier?

I test communication systems that allow the soldiers to talk to each other from different places around the world.

2) What drew you to the STEM field originally?

I always had an interest in math and science. One day in middle school we did an activity called “Career Cruising” where kids could take classes they were interested in and find careers that corresponded to them. That’s when I found aerospace engineering and decided that’s what I wanted to do.

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

The most important STEM innovation that I have seen has been all the innovations in space flight. I was able to witness the first flight of the SpaceX Falcon Heavy Rocket and the test flight of the Space Launch System that will take us back to the moon.

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

STEM is important because the world around us is always changing. We have technology now that some thought 10 years ago was impossible. This means that new things need to be created to combat these new technologies. We need strong and passionate people to join STEM and help make today and the future a better place.

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

Students should engage with their teachers and ask about any clubs that are available around the school that involve STEM. I was part of the First Tech Challenge in high school, and it helped show me how interesting it is to create a solution to a given problem. Also, students should not be afraid to look up videos about topics that they find interesting. This may help them find a specific area that they really enjoy in STEM.

STEM Challenge

Connecting Hearts



Have you ever heard of the saying love connects us? In this fun and simple activity, you will be able to connect as many hearts as you want. While it might sound easy to connect these hearts, will you be able to build them up high?

Materials:

- 1 flat tray
- Box of 100 tooth pick
- Two bags of heart shaped gummies
- A timer

Requirements:

- Cannot use tape.
- Only use the materials mentioned above.
- The structure should not exceed 2 feet.
- Build has to be completed in under ten minutes.

Mission: In honor of Valentine's Day, we want to see how many hearts you can connect to make a 1 ½ to 2 foot free-standing structure. Using only toothpicks and heart shaped gummies, build a tall freestanding building by connecting together as many hearts as you can. How many hearts can you connect in under ten minutes?



Design Process:

ASK: What needs to be accomplished? Build a strong freestanding structure with the materials provided that meets the required height limit.

PLAN: Draw out your base for the structure. Without a strong base, your structure will not stand. Ask yourself, will this base create a strong foundation for your structure?

CREATE: Depending on which direction you plan on going, stick one end of the toothpick into the gummy. Stick another gummy to the other end of the same toothpick. Continue this process until your structure begins to form.

IMPROVE: As your structure begins to form ask yourself; how could you expand from your original idea to make the structure even better?

Questions to Ask: What kind of structure would I have to make to achieve the height that I want? How can I construct it in a way that it won't easily break?

Fun Joke: What is the heart's favorite shade of red? — It's beat-red



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 access to educational and extracurricular opportunities in STEM. For more information about our STEM Outreach Programs, visit us on the web: https://c5isr.ccdc.army.mil/student_programs/

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

STEM Highlight of the Week

STEM Story Hour: Looking Back on January

Students who attended our STEM Story Hour program participated in a mission-based activity where they had to design a new and improved vehicle that would be able to travel in multiple ways.

The kindergarten through second grade students who attended Story Hour worked as a team to design a vehicle they named “Foxy Rainbow Foxy.” They collaborated and provided suggestions about seating and safety needs, as well as some fun additions like wings and roller blade wheels.

Taking it further:

In addition to working together to design a vehicle as a team, students added their own ideas or created their own design for a vehicle.



Luci R. followed along with the team design “Boxy Rainbow Foxy” but took it further by adding her own improvements to her design.



Derek R. was another student who participated in the activity, decided to go in a different direction from the team design. His vehicle’s name is “Forty” because it has 40 items.



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

**THE NEXT
GENERATION OF
INNOVATORS**

STEM in our World

Are Videogames Improving Kids Memories

Can playing videogames really benefit ones memory? If you ask active video gamers, they would of course say yes. However to date, there has not been a clear answer to this question. Bader Chaarani, a neuroscientist from the University of Vermont, believes that the reasoning for this is due to the small amount of test subjects reviewed in past studies. Chaarani, along with a team of researchers have set out to retest this theory, only this time, they would have to obtain “as big a sample as they can get.” In other words, they would have to test two larger groups of children, one group claiming to be active gamers and the other non-active, in order get a much more defined answer.



Charrani and his team tested 2,217 children, ages 9-10, from 21 different sites across the United States. All participants were asked to take part in an Adolescent Brain Cognitive Development (ABCD) Study. This study is a common test that takes place every year through The Brain Development Cohorts (NBDC) Bio specimen Access Program; a program that provides access to the research community on bio specimen collected through different studies. Participants in these studies answer a series of questions on different subjects. Some deal with things like their height, weight, and physical health. Others focus on a kid’s activity, mental health, and more. Every other year, the scientists also perform an MRI scan of each kid’s brain and how it effects their cognitive development.

In this video game study, children were asked to complete a series of tasks (both memory and alertness related) and answer questions while in the MRI scanner. This would help the researchers compare scans from the two groups, looking for signs that might point to differences in their cognition. As children completed the tasks and answered the questions, the scanner recorded the activity in their brains. The end results favored the gamers. Gamers proved better at both tasks compared to non-gamers. Their reaction time proved to be a lot faster and more alert.

What does this prove? Chaarani says that the parts of the brain which are “highly involved in working memory, attention, and problem solving” were more active in gamers.

“This is not surprising because games require fast-paced processing of all kinds of information within a very short amount of time. They require problem solving, and a lot of visual attention,” he said.

So, do video games really help strengthen your memory? Do active gamers really have an advantage? While video games do prompt you to make quick decisions and compete tasks in a swift way, researchers still don’t think it is a good tool to use to strengthen ones cognitive memory.

“Many media sources have been interpreting these results to mean that video gaming is good for you. We’re not saying that,” Chaarani concluded. “While this study does prove that gamers had a better memory then non gamers, too much screen time in general could lead to significant brain changes which in turn, could come at the expense of other brain functions.”



Resources:

B. Chaarani et al. Association of video gaming with cognitive performance among children. JAMA Network Open. Vol. 5, published online October 24, 2022. doi: 10.1001/jamanetworkopen.2022.35721.

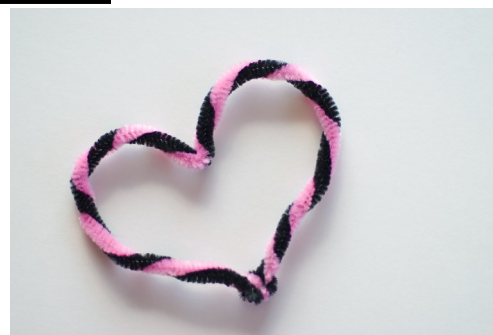
“NIH Brain Development Cohorts (NBDC) Biospecimen Access Program.” *National Institutes of Health*, U.S. Department of Health and Human Services, 30 Nov. 2022, <https://nida.nih.gov/funding/nida-funding-opportunities/nih-brain-development-cohorts-biospecimen-access-program>.

Stevens, Alison Pearce. “Playing Video Games May Improve Your Memory and Attention.” *Science News Explores*, 2 Jan. 2023, <https://www.snews.org/article/playing-video-games-may-improve-memory-attention>.

STEM Experiment

Crystalized / Icy Hearts

Love is in the air this month and while we often want to warm the hearts of others, we should try and seek out some icy hearts. When speaking about icy hearts, we often think of them as cold, sad, and lonely. They have developed a bad reputation. This experiment will have you looking at icy hearts in a different way by making an icy/crystalized heart yourself. Once this experiment is complete, you may find that some icy or crystalized hearts are still beautiful and are worthy of your attention.



Directions:

1. Take your pipe cleaners and shape them into a heart. Make sure that the size and shape of your heart will fit into the jar without touching the sides.
2. Take the Popsicle stick or pencil and tie a piece of string around it. Make sure the string is long enough to tie and dip your heart into the jar.
3. Tape the string to the stick and tie your heart to the bottom of the string.
4. In your jar, pour in salt and $\frac{1}{2}$ cup of boiling water and stir in salt until you see salt grains that won't dissolve when stirred.
5. Place your heart in the solution and make sure it is fully submerged.
6. Sit the jar in a place where it will not be disturbed. DO NOT TUG THE STRING, STIR THE SOLUTION, OR MOVE THE JAR FAST.
7. Leave the jar alone for 24 hours.
8. Once 24 hours have past, gently lift your crystal heart out of the jar and place it on a paper towel for an hour to dry.

How Does This Work?

While your heart was soaking in the mixture, you might have noticed that the heart was starting to collect little crystals. These are solid particles and if left untouched within the liquid mixture, they will start to settle on the closest surface. In this case your pipe cleaner heart, thus resulting in the forming of clear crystals.

Water is made up of something called molecules. When molecules become hot, they "dance" or move away from each other. When you add the Borax to the boiling water, the molecules dissolve the powder creating a saturated solution (solid particles) for your experiment. The hotter the water, the farther the molecules will stay apart, allowing more powder to dissolve. As the solution cools, those molecules slow down and move back together. Some will not form back together and instead, settle on the pipe cleaner where it will then begin to form a crystal. Once one crystal seed has formed, more "falling molecules" will stick to each other forming one big crystal.

Materials:

- Table salt
- Measuring spoons
- A glass jar or vase
- Popsicle stick or Pencil
- String
- Tape
- Pipe cleaners
- $\frac{1}{2}$ cup of boiling water
- Paper towel



SAFETY FIRST!
You Must Have
Adult Supervision
To Complete This
Activity.

Fun Facts: Did you know that molecules have different shapes? Some are long spirals while others may be pyramid shaped.

Resources:

McClelland, Sarah. "Grow Crystal Hearts for Valentine's Day." *Little Bins for Little Hands*, 25 Jan. 2023, <https://littlebinsforlittlehands.com/crystal-hearts-valentines-science-experiment/>.