APPROVED FOR PUBLIC RELEASE

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.

In this Issue...

VOL 2, Issue 8

Brain Teaser

The more you code, the more of me there is. I may be gone for now, but you can't get rid of me forever.

What am I?

Answer on Page 2

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 opportunities in the areas of science, technology, engineering, and math, or STEM.

For more information about our STEM Outreach Programs, visit us on the web: https://c5isr.ccdc.army.mil/student_programs/

Quick Minute STEM Challenge: Strongest Raft

Are you up for the challenge?

Materials:

- Egg or plastic egg
- Styrofoam
- Aluminum cans
- Small plastic cups
- Tape
- Water bottle
- Other useful items in your home

SAFETY FIRST! You Must Have Adult Supervision To Complete This

Every engineer has not only a design goal, but there are almost always restrictions on how they get to a solution. Sometimes it is a time limit, sometimes they may not have access to material they would like to use. Part of the creativity of engineering is figuring out how to overcome these ***CONSTRAINTS*** to solve the problem.

DESIGN CHALLENGE: Build a structure that will not only float on water, but also hold an egg while floating.

CONSTRAINTS: Do not use bath or pool toys in the construction of your flotation device.

VOCABULARY WORD:

CONSTRAINT— a constraint is a control that limits or restricts what you can do

With the help of a parent or guardian, please send photos of your build to us via email at usarmy.apg.devcom-c5isr.mbx.outreach@army.mil.and they may be included in our May issue.

Do you have what it takes to be a STEM leader of the Future?

AEOP Apprenticeships and Fellowships help you gain the skills and experience you need today to prepare for the STEM careers of tomorrow. Programs are available for students in high school and college as well as for enrolled in graduate and post-doctoral programs

The future is bright for careers in STEM. STEM careers are projected to continue to grow at a faster rate than non-STEM careers in the next decade. Make sure you have the skills you will need.

Find out more at https://www.usaeop.com/apprenticeships-fellowships/

Answer from Page 1: A bug

STEM Challenge

Let's Go Fly a Kite Challenge

Did you know April is National Kite Month? Kites have been around for centuries with evidence showing that they were flown in China over 2000 years ago. Although the exact date, origin, and inventor are unknown, there have been various kite designs over the years that were intended for different purposes. Some of the uses of these kite designs include: military measures for enemy observation and signaling, delivering messages, kite flying, carrying fish bait, tools for scientific research to learn more about wind and weather, pulling carriages, use to raise meteorological instruments and cameras by the US Weather Services, sport, leisure activity. Lastly, kites have become a part of many different cultures.

Mission:

The mayor of Baileyville is holding a kite competition that is set to take place in the town's local park on May 18. The rules of the contest are: the kite must stay in the air for at least 20 seconds and be intended for a specific purpose. The mayor's instructions are that the purpose can be anything from recreation to scientific use. Participants who compete in the kite competition are allowed to have up to 5

Requirements:

- Kite must be able to stay in the air for at least 20 seconds .
- Kite must be designed with an intended purpose in mind.

Materials:

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

SAFETY FIRST!

You Must Have Adult Supervision To Complete This Activity.

SHARE

Facebook.com/DEVCOM.C5ISR

#C5ISRCenterSTEM

***You must have permission from your grownups before using social media.*

Design Process:

ASK: What is the problem you need to solve? A way to win a kite contest with a design that has specific purpose.

IMAGINE: Brainstorm and decide on one idea. How will you design a kite that has a specific purpose in order to when the contest?

PLAN: Draw a picture of your device. What will your kite look like?

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

IMPROVE: How could you improve your kite?

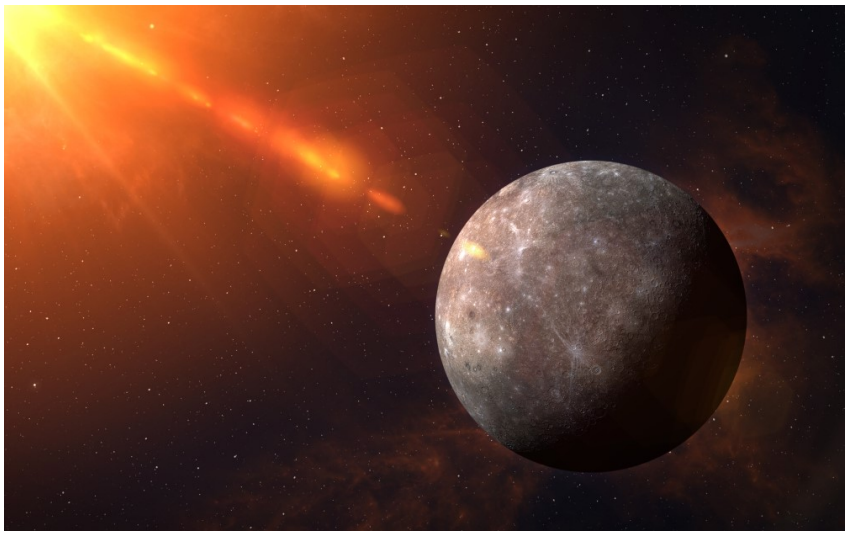
Questions to Ask: If you had more choices of materials, what would you use and why? What is the intended purpose for your kite and does it solve that purpose?

SHARE: Show your family and friends your new design of your kite and explain how it works.

STEM in the News

Magnetic storms over Mercury

An international team of researchers and scientists has proved that Mercury has magnetic storms similar to those we have on Earth. The research was conducted by a team of scientists from the United States, Canada and China and led by Hui Zhang, a space physics professor at the University of Alaska Fairbanks Geophysical Institute. Their findings answer the question of whether other planets, including the ones outside our solar system, can have geomagnetic storms regardless of the size of their magnetosphere or whether they have an Earth-like ionosphere. Their research, published by the University of Alaska Fairbanks, proves that Mercury has a ring current, a doughnut-shaped field of charged particles flowing laterally around the planet and excluding the poles, that triggers the planet's geomagnetic storms.



A geomagnetic storm is a major disturbance in a planet's magnetosphere, caused by the transfer of energy from the solar wind. Such storms in Earth's magnetosphere produce the aurora and can affect radio communications. Mercury has a ring current, just like Earth has a ring current.

"The processes of the storms on Mercury are quite similar to here on Earth," Zhang said. "The main differences are the size of the planet and Mercury has a weak magnetic field and practically no atmosphere."

The confirmation of geomagnetic storms on Mercury result from research made possible by a unexpected coincidence: a series of coronal mass ejections from the sun on April 8 through 18, 2015, and the end of NASA's Messenger space probe, which launched in 2004 and crashed into the planet's surface on April 30, 2015, at the expected end of its mission.

A coronal mass ejection, or CME, is an ejected cloud of the sun's plasma -- a gas made of charged particles. That cloud includes the plasma's embedded magnetic field. The CME of April 14 proved to be the key for the team. It compressed Mercury's ring current on the sun-facing side and increased the current's energy.

"The sudden intensification of a ring current causes the main phase of a magnetic storm," Zhang said, "but this doesn't mean Mercury has aurora displays exactly like those on Earth."

On Earth, the storms create the auroras when solar wind particles interact with the particles in the atmosphere. But on Mercury, the solar wind particles don't encounter an atmosphere, and instead reach the surface freely and may only be visible only through X-ray and gamma ray examination. The results of the research show that magnetic storms are potentially a common feature of magnetized planets.

"The results obtained from Messenger provide a further fascinating insight into Mercury's place in the evolution of the solar system following the discovery of its intrinsic planetary magnetic field," it concludes. Other institutions involved in the research include the University of Alberta Edmonton, University of Michigan, and the Heliophysics Science Division at NASA's Goddard Space Flight Center.

Fun facts about Mercury

- Mercury takes 59 Earth days to make one full rotation.
- Mercury has a solid surface that is covered with craters like our Moon.
- Though it is the closest planet to the Sun, temperatures on Mercury are both hot and cold.

Source: https://uaf.edu/news/uaf-researcher-in-papers-that-prove-mercury-has-magnetic-storms.php

STEM Activity

Rainbow in a Jar Experiment

With it being spring time you may see lots of rain showers and with that you may be lucky to see a rainbow in the sky or even on the ground. You would think when you combine, blue, green, yellow and red water in a glass you would end up with brown, but with using the science of density you can create a rainbow effect. With just a few simple ingredients you can create your own beautiful rainbow in a jar.

Materials:

- 5 jars or clear glasses
- Warm water
- Liquid measuring cup
- Measuring teaspoon
- Baster or pipette
- Sugar

Directions:

1. Pour ¼ cup of warm water into 4 of your glasses. It is important to make sure each glass has the same amount of liquid.
2. Add a few drops of food coloring to each glass or water and mix the colors in with a spoon using each color red, yellow, green and blue.
3. Measure and add a different amount of sugar to each glass of colored water.

Red color- 1 tablespoon
Yellow- 2 tablespoons
Green- 3 Tablespoons
Blue- 4 tablespoons

SAFETY FIRST!

You Must Have Adult Supervision To Complete This Activity.

4. Stir each of the glasses until the sugar is completely dissolved. (Tip: Heating your water for 5 to 10 seconds in the microwave and stirring may help to dissolve the sugar faster)
5. Use your baster or pipette to transfer about half of your blue water into your empty glass.
6. Use the baster again to slowly transfer half of the green water on top of the blue water in the glass.

The Science Explained:

This simple fun experiment explores the science of density. Density is the measure of how much of an item is packed into a measured space. The actual equation for density is: Density = Mass (amount of item) ÷ Volume (a measured space). Almost every substance and material you can think of has a different density. This holds true for the four solutions you mixed using sugar and water.

In the experiment when you increased the amount of sugar in each mixture, but kept the amount of water constant, you created solutions that had a variety of increasing densities. The more sugar you added in each glass of the water, the greater the density of the water. It had the same space with the same amount of water, but more material in it. The more sugar that is mixed into a measured amount of water results in a higher density of the mixture.

The Sugar Rainbow revealed that a solution with a low density will stack on top of a mixture with high density. When a solution is denser it will sink towards the bottom. Density helps us predict if something will sink or float and is very important when engineers consider designing ships or submarines.

Resource: https://www.sciencefun.org/kidszone/experiments/dirty-pennies-kitchen-science-experiment/

Did you know?

Sugar is a sucrose composed of 12 atoms of carbon, 22 atoms of hydrogen and 11 atoms of oxygen making it a carbohydrate. Glycoladehyde is an eight-atom sugar that has been found in a interstellar gas cloud near the center of the Milky Way.