THURSTON COUNTY 4-H STEM/STEAM KITS

4-H20 2010 National Science Day Experiment. The experiment, designed in conjunction with North Carolina A&T State University Extension and North Carolina 4-H, offers several activities to showcase, at the simplest level, how CO2 can affect aquatic animals, plants, and other living organisms in lakes, streams, rivers, and oceans. 4-H2O features a series of interactive activities and discussions to demonstrate the importance of water quality and its relevance to climate change. Using typical chemistry tools, worksheets, online guides, and Web-based demonstrations, the experiment will help youth learn and then connect back to their own lives by encouraging the measurement of their own personal impact on the environment, along with the impact of their families.

Biofuel Blast 2009 National Science Day Experiment. Renewable energy sources like biofuels are constantly making headlines in the news today. This experiment explores the production of the biofuel ethanol. It is typically made in the US by converting the starches from corn kernels into the sugars in corn syrup, and then adding yeast to break down the sugars, which releases carbon dioxide and ethanol as byproducts. The ethanol is blended with gasoline and then sold at some gas stations. There you might see a sign at the pump that says "E10," which means 10 percent ethanol and 90 percent gasoline. In our experiment, the fermentation of sugars by yeast produces energy for the yeast and releases carbon dioxide and ethanol as waste products.


Block Tower Challenge In this activity, participants will use their architectural/engineering skills to design the tallest tower with only one block at its base. They will then build the tower to see if the design works. Upon reassessment they will have the opportunity to reconstruct their towers to see if they can have a more successful structure that is larger before falling.

Bridge Design Bridges have been built for centuries, and with many different designs. According to Guinness World Records, the oldest bridge is the slab-stone single-arch bridge over the river Meles in Turkey, going back to 850 BC, meaning it is nearly 3,000 years old! In this activity, kids will learn about the engineering design process and the basic mechanics behind building bridges while designing their own bridge.
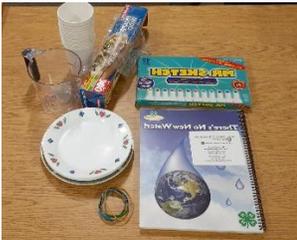
Can You Make it Rain? Through the development and exploration of their own ideas, youth will simulate an abbreviated version of the water cycle by making evaporated water condense to form "rain" drops.
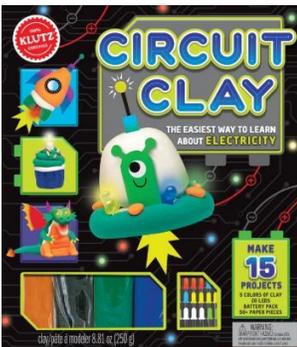
Circuit Clay Learn about electricity and circuits using specially formulated clay and LEDs to make sculptures that light up and glow.

Code Your World 2018 National Youth Science Day Experiment. Code Your World is a four-part challenge that teaches kids ages 8-14 to apply CS to the world around them through hands-on activities. Developed by Google and West Virginia University Extension Service, it includes a computer-based activity on Google's CS First platform and three unplugged activities that bring coding to life through games and interaction.

Egg Drop Challenge The purpose of this challenge is to explore the conversion of potential to kinetic energy. Participants will design and build a device to prevent breaking a raw egg when dropped. Participants will build multiple devices and make comparisons between each design.

Entomology Let's go outside! Our entomology kit encourages participants to explore the world around them through the life of insects. This kit includes materials for several activities, including creating field guides, as well as bug collection and identification. A white sheet is included to place under a shrub or branch, shake it, and identify the insects that fall onto the sheet. Trowels allow students to dig up dirt, along with the insects that live there. Age level: 5-11, K-5th grade.

Foam Rockets This activity involves constructing rockets made from pipe insulating foam. Participants use the rockets to investigate the trajectory relationship between launch angle and range in a controlled investigation. Science applications include kinetic and potential energy, Newton's Laws, gravity, applying the scientific method, interpreting data, and graphing. Designed for youth in grades 2-8; may be used for youth in grades 9-12 when applying physics properties to the rocket. Lesson may take from 45 minutes to 2 hours, depending on the depth of science concepts applied.

Forest Ecology Ecology is the study of relationships between living things and their environment. In these activities, youth will recognize the importance of forests; identify different types of forests, trees and forest products; and develop skills necessary to keep forests healthy.

Galactic Quest 2021 National Youth Science Day Challenge. This challenge includes four space related activities: Stellar Optics, Cipher Space, Astro Adventure, and Cosmic Claw. The theme of space exploration takes youth on an out-of-this world adventure and makes connections to the 4-H pillars—STEM, civic engagement, healthy living, and agriculture. The activities allow youth to develop inquiry, observational, and problem-solving skills while they make discoveries and develop their STEM identities. Galactic Quest is ideal for youth ages 8 to 14 years to spark an interest in STEM and inspire real-world actions.

Game Changers 2019 National Youth Science Day Challenge. Game Changers teaches kids ages 8-14 how to use computer science (CS) to create games, solve problems, and engage with topics they're passionate about. The challenge uses physical activity and puzzles to teach kids important CS concepts and problem-solving skills, creating real-world connections between computer science and civic engagement, healthy living, and agriculture. Although the challenge includes one computer-based and two unplugged activities to help kids learn CS, all can be completed without internet access.

Get Things Rolling (Junk Drawer Robotics) This kit contains several activities related to friction. Participants will design and build a "clip mobile" which they will use to complete the activities. This kit is one module of a larger kit, "Junk Drawer Robotics".

Geology Geology is the science that studies the earth, including the study of materials that make up the earth, the processes that change it, and the history of how it evolved. In this project, you will look at the story of the earth to gain a better understanding of the earth and the sources of the minerals you use each day.

Honeybee Challenge Heard the buzz? The Honeybee Challenge teaches how bees are an integral part of food production. Youth begin with a farm-to-table activity, identifying foods that are reliant on bee pollination. Then, working in teams, youth will create "bee" bots and have them navigate a forage route over different fields. Follow-up discussion emphasizes the importance of honey bees and agriculture, as well as outlining ways for youth to help bees in their own community. Age Level: 8+; 3rd-8th grade Time: 2-3 hours. Applications: Ecology, Agriculture, Apiology (honey bees), Pollination.

Incredible Wearables 2017 National Youth Science Day Experiment. Health monitoring using a wearable device is an interesting engineering problem. The idea is to connect an instrument that measures signals from your body (biological signals) and converts those signals to data that then can be analyzed. In this challenge, participants will design a wearable device that tracks biological data (pulse rate and movement) and will use the device to provide feedback on their activity level.

Junk Drawer Robotics The Junk Drawer Robotics curriculum is divided into three levels or books each around a central theme related to robotics design, use, construction, and control. Each level starts out with background information on working with youth, curriculum elements, and a focus on the concepts to be addressed. Modules within each book target major concepts of the theme, and each contain five or more activities that help develop an understanding of the concepts, create solutions to challenges, and develop skills in constructing alternatives. The theme in Level 1 is robotic arms, hands, and grippers. In Level 2, the theme is moving, power transfer, and locomotion. In Level 3, the theme is the connection between mechanical and electronic elements.

Keva Planks KEVA Planks are cuboid wooden blocks for children and adults. Each block is sized approximately 1/4 inch (6.35 mm) x 3/4 inch (19.05 mm) x 4 1/2 inches (114.3 mm). Keva Planks are unusual because they only use one piece with no connectors or glue, in contrast to other building sets that often have specific instructions, connectors, and require sorting. Children and adults alike can create original artwork or Rube Goldberg style ball runs. Many building challenges are available.

LilyPad Sewable Electronics Kit Learn how to sew circuits! Make your crafts come alive with conductive thread, buttons, switches, LED, and a microcontroller. No previous electronics, soldering or sewing experience required.

Machine Inventors This kit contains materials to complete a Rube Goldberg Machine Contest, a contest in which students ages 8-18 build devices to complete a simple task in a minimum of twenty steps and a maximum of seventy five, in the style of American cartoonist Rube Goldberg.

Magic of Electricity In the Magic of Electricity kit, participants will learn about the basic principles of electricity. This kit includes all you need to teach what electricity is, how it works, and how you can apply it to things in everyday life. Some if the lessons include building circuits, lighting bulbs, detecting magnet fields, creating an electromagnet, and more!

Makey Makey
Makey Makey is an invention kit for the 21st century. Turn everyday objects into touch pad and combine them with the internet. It's a simple invention kit for beginners and experts doing art, engineering, and everything in between. With the Makey Makey, youth can make any conductive material act as the input device for a computer.

Maps and Apps
With 4-H **Maps** & **Apps**, youth become geospatial thinkers as they design and **map** their ideal park, use GIS **mapping** to solve community problems and contribute data about their community to the United States Geological Survey. This activity provides an opportunity to "explore space" with the help of geographic information systems (GIS). In two separate activities, youth will apply geospatial thinking and use GIS to gather data, make maps, and analyze the "whys of where" as they investigate real-world problems that are relevant to their own community.

Marshmallow Catapults
In this activity, youth will design a catapult with basic materials using only weights and gravity as the power source. During the activity, youth will learn about form, function, design, and the manufacturing process. They will plan, build, test, modify, and record results on the Marshmallow Challenge worksheet.

Metatronics
From Junk Drawer Robotics, Level 3, Module 4. Programming allows us to control robot behavior. Basic logic elements in programming allow us to predict outcomes. Flowcharts are often used in programming to help design and clarify instructions. Input, output, if-then-else, loops, go to, and other commands are core components of simple programs. In this activity, youth will illustrate the concepts of input, processes, and output through an activity simulation. They will follow simple flowchart instructions to act out the role of processor in a simple computer program. They will plan and design a program using the flowchart format involving basic commands like loops, go to, and if-then-else so the program can be acted out on a grid. Youth will also follow the program designed by another group and offer suggestions for improvement.

Monarchs on the Move

Did you know that the monarch butterfly numbers are declining? The 4-H Monarchs on the Move Challenge engages youth with a model that simulates caterpillars' needs and biological and environmental challenges that influence survival rates. Youth will work collaboratively to obtain "food" while avoiding predation or harmful environmental conditions. Youth will learn how landscapes are managed to increase biodiversity to benefit monarch butterflies, pollinators, and other wildlife. They will strategize about how to ad monarch habitats to land as they explore various scenarios to increase biodiversity in agricultural and urban landscapes. Youth will learn that everyone can contribute to increasing monarch butterfly habitat, and as a result, increase biodiversity in nearly any location by planting milkweed and flowers.

Motion Commotion

This is a two-part experiment that investigates the physical and human factors of motion using toy cars to simulate a speeding car collision and distracted driving.

Ornithology

This kit will get youth interested and started in ornithology, a branch of zoology that concerns the "methodological study and consequent knowledge of birds with all that relates to them."

People Shapes

With this kit, younger children can create self-portraits, favorite storybook characters and more.

Rain to Drain Rain to Drain-Slow the Flow is a hands-on stormwater education curriculum. This experiment style series of activities leads youth to a better understanding of the movement of stormwater in natural and developed communities. It's also a great introduction to green infrastructure and stormwater best management practices. For middle-school aged youth; it is also easily adaptable to older and younger youth.

Rockets to the Rescue The 2014 National Science Experiment, Rockets to the Rescue, provides the opportunity to explore firsthand how aerospace engineering can be used to solve real world challenges, such as food distribution in emergency situations, to make a positive impact in our world. Using the lessons learned in science, math and physics, youth will design and develop an aerodynamic Food Transportation Device (FTD) that can deliver a payload to a desired target using different trajectories.

Solar Powered Houses Design and build a solar powered house and then light up the entire neighborhood! Using a solar panel, conductive tape, and LED lights, youth will learn about solar energy and circuits. This challenge is the perfect activity for an ice-breaker, in-service day, or after school session, and can be used as an introduction to STEM education. Designed for youth grades 4-12.

WearTec Circuitry (Book 1) The WearTec project is focused on activities related to wearable technologies. The project is designed for youth in grades 4-6 to teach engineering design, computer programming, basic circuitry and sewing. This kit contains instructions and supplies to create several projects, including a bow, badge and card.

WearTec Sewing and Microcontrollers

(Book 2) The WearTec project is focused on activities related to wearable technologies. The project is designed for youth in grades 4-6 to teach engineering design, computer programming, basic circuitry and sewing. The project focuses on solving real world problems, engineering design, and the innovative area of wearable technologies. This kit contains instructions and supplies to create several projects, including a "sewing 101" lesson, stuffed monster, and lighted silk flower. Please note some supplies are not included.

WearTec Programming (Book 3) The WearTec project is

focused on activities related to wearable technologies. The project is designed for youth in grades 4-6 to teach engineering design, computer programming, basic circuitry and sewing. The project focuses on solving real world problems, engineering design, and the innovative area of wearable technologies. In this kit, youth will learn basic computer programming and coding using SparkFun LilyPad products.