



Family Engineering Night Kits

Kit Components & Dimensions

-There are 3 complete Family Engineering Night Kits – Unit 1, Unit 2, and Unit 3

-Each FEN Kit consists of a “rolling locker” that includes 13 activities that are each in a large Ziploc bag

-Each “rolling locker” is

- Height 19 ¾”
- Width 19 ¾”
- Length 39 ½”

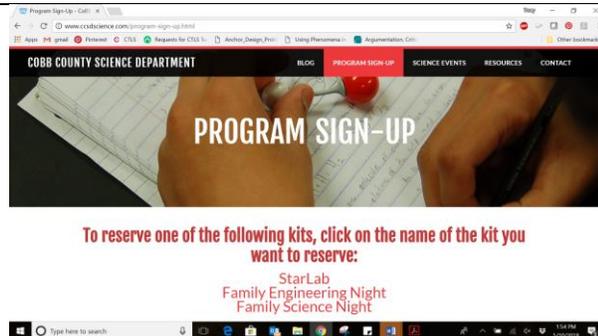


Kit Check-Out

-FEN Kits will be checked out for **1 week at a time (Tuesday- Tuesday or Thursday-Thursday)**

-Please visit the “Program Sign-Up” page on www.ccsdscience.com to link to the Sign-Up Genius calendar online to see available dates and make your reservation.

-When you enter your name on the Sign-Up Genius, please also type your school name in the “My Comments” box.



Kit Delivery and Pick-Up

-The warehouse will deliver your kit to your school the first day you are signed up for it (Tuesday or Thursday).

-The warehouse will pick-up your kit at the end of your one-week reservation (either the following Tuesday or Thursday)

-Please email or call Kevin Long (kevin.long@cobbk12.org or 770-426-3496) or Ellen Glantzberg (ellen.glantzberg@cobbk12.org or 770-426-3562) if you have problems.



Family Engineering Night Kit Overview

These 13 activities are short, fun experiences with engineering. They are designed to be quick, hands-on activities that encourage families to experiment, tinker, and solve problems together. They are individual, self-directed, tabletop activities that families can engage in at their own pace. You can pick the activities that you feel will work best for your school and allotted time or you can utilize all 13 activities.

They typically require a tabletop or flat surface, an activity sign, two adults per activity to supervise, the provided materials and possibly a very small amount of preparation and supplies, which would be provided by the school. You will find a list of each activity, the supplies provided, supplies needed and additional preparation needed in the table on the next page.

Additionally, example cafeteria and gymnasium layouts have been provided. It is suggested that you hold a Family Engineering Night in combination with an additional event where the grade levels can be split K-2 & 3-5. This will ensure that the room and activities do not become overcrowded. See the suggested time allotments below based on the number of expected participants per grade level split (K-2 and 3-5). Please keep in mind that these are ONLY suggestions and that all 13 activities are prepped and ready for use! The more activities that you set up, the more opportunities your students will have to experience engineering!

Number of Participants	Scheduled Time for Activities		
	15 minutes	30 minutes	40 minutes
25-75	4-5 Activities	8-9 Activities	10-12 Activities
75-100	5-6 Activities	9-10 Activities	11-12 Activities
100-150	5-6 Activities	9-10 Activities	12-13 Activities

Activity Descriptions

	Short Summary	Materials Included	Materials NEEDED	Advanced Preparation Needed
Against the Wind	<p>This activity allows for students to explore how engineers save energy through design. They will experiment with different aerodynamic designs on model cars to establish which is the most aerodynamic design.</p> <p><u>Engineering Fields:</u> Mechanical and Aerospace engineering <u>Engineering Concepts & Skills:</u> optimization/tradeoffs, sustainability, modeling, controlled experimentation and testing.</p>	<ul style="list-style-type: none"> -5 matchbox cars -Index Cards -Rubberbands -12" x 20" piece of cardboard -Small clip-on fan -Extension cord -Activity Sign and stand 	<ul style="list-style-type: none"> -One Large book, 1-1 1/2" thick -Tape 	<ol style="list-style-type: none"> 1. Cut index cards in half and attach a card piece to each car in a different design using tape (see activity signage). Make sure that the wheels are free so that they still roll smoothly. Make sure that you have one car that will NOT be affected by the wind when placed in front of the fan. 2. Place one end of the cardboard piece on the edge of the book and create a ramp. 3. Place the fan about 18"-20" away from the bottom of the ramp.
Arches	<p>This activity allows for students to explore and understand why engineers build arched bridges as opposed to a standard bridge. Students will compare the number of erasers an arch bridge will hold in comparison to a standard bridge.</p> <p><u>Engineering Fields:</u> Civil engineering <u>Engineering Concepts & Skills:</u> Controlled experiment and testing, and modeling</p>	<ul style="list-style-type: none"> -4" x 12" strip of poster board -2 unopened cans of food -8 rectangular erasers -11" x 17" piece of paper (mat) -Activity sign and stand 	<ul style="list-style-type: none"> -Masking tape 	<ol style="list-style-type: none"> 1. Tape the mat to the table.
Domino Diving Board	<p>This activity allows for students to understand how a cantilever must be designed to be structurally safe. Students will create a cantilever using dominoes and a book.</p> <p><u>Engineering Fields:</u> Civil and Mechanical engineering <u>Engineering Concepts & Skills:</u> Role of failure and modeling</p>	<ul style="list-style-type: none"> -Set of dominoes -Ruler -Activity sign and stand 	<ul style="list-style-type: none"> -Thick, hard cover book 	<ol style="list-style-type: none"> 1. Place the book and dominoes on a sturdy table that does not wobble or shake. 2. Tape the ruler to the table with "zero" placed next to the book.

Glue Is The Clue	<p>This activity allows for students to explore how engineers make things stronger through the use of glue (i.e. plywood). Students will compare the amount of washers a glued and unglued card will hold.</p> <p><u>Engineering Fields:</u> Materials and Chemical engineering</p> <p><u>Engineering Concepts & Skills:</u> Role of failure and controlled experimentation & testing</p>	<ul style="list-style-type: none"> -2 Index cards labeled "glued" -2 Index cards labeled "unglued" -2 plastic cups -30 flat metal washers -Activity sign and stand 	Tape	Tape the two cups upside down on the table surface so that the tops are 4 inches apart.
Inspired By Nature	<p>This activity allows for students to recognize how engineers use things from nature to create new ideas for inventions. Students will match the "human invention" with its inspiration from nature.</p> <p><u>Engineering Fields:</u> General engineering</p> <p><u>Engineering Concepts & Skills:</u> engineering design process and invention/innovation</p>	<ul style="list-style-type: none"> -Set of "Human Invention" cards -Set of "Nature's Inspiration" cards -Sorting mat -Activity sign and stand 	-Masking tape	<ol style="list-style-type: none"> 1. Attach the sorting mat to the table. 2. Place all of the cards on the table with the pictures facing up.
Learning From Failure	<p>Students realize in this activity that failure plays an important role in the design process. They will create aluminum foil boats to hold an estimated number of pennies.</p> <p><u>Engineering Fields:</u> General Engineering</p> <p><u>Engineering Concepts & Skills:</u> role of failure, engineering design process, open-ended problem-solving</p>	<ul style="list-style-type: none"> -Plastic Container -4" aluminum foil squares -Container of 50 pennies -Cookie Sheet -Activity sign and stand 	-Paper towels -Water	<ol style="list-style-type: none"> 1. Check to make sure that you have enough pieces of aluminum foil cut into 4" squares. 2. Add water to the plastic container and sit it on the cookie sheet to catch spills. <p>"Event Tip" make sure to monitor for spills.</p>
Let's Communicate	<p>Students will realize the importance that communication plays in engineering. They will be working in pairs to recreate their partners building by listening to the "engineer's" verbal directions.</p> <p><u>Engineering Fields:</u> General engineering</p> <p><u>Engineering Concepts & Skills:</u> communication, teamwork, spatial ability</p>	<ul style="list-style-type: none"> -2 plastic containers with identical LEGO blocks -Box labeled "Engineer" -Box labeled "Builder" -Activity sign and stand 	N/A	<ol style="list-style-type: none"> 1. Place the boxes on a table with the open sides facing opposite directions.

Showerhead Showdown	<p>Students will explore the idea of optimization and sustainability through the exploration of older showerheads and the new "low flow" showerheads.</p> <p><u>Engineering Fields:</u> Environmental and Mechanical engineering</p> <p><u>Engineering Concepts & Skills:</u> optimization/tradeoffs, sustainability</p>	<p>-2 clear 9 oz. plastic cups -6" x 8" plastic container -Hand towel -Activity sign and stand</p>	<p>-Paper towels -Water -Trashcan</p>	<p>1. Fill the plastic container with water to a depth of 1-2" DEEPER than the height of the cups.</p> <p>2. Place the hand towel under the plastic tub to soak up splashes and some paper towels on the table for drying hands.</p> <p>“EVENT TIPS” Place the small trash container beneath the table for used paper towels. Check in this activity area periodically to wipe up any water that may have been splashed onto the floor.</p>
Solid Ground	<p>Students will explore why engineers test different types of earth materials to determine a good place to build. They will be comparing how rough gravel, smooth gravel and sand compare for use as a foundation.</p> <p><u>Engineering Fields:</u> Geological and Civil engineering</p> <p><u>Engineering Concepts & Skills:</u> optimization/tradeoffs, controlled experimentation and testing</p>	<p>-3 Plastic containers filled with "rough gravel," "smooth gravel" & "sand" -3 large LEGOS -Activity sign and stand</p>	<p>N/A</p>	<p>1. Place a large LEGO on top of each of the materials in the containers.</p>
Thrill Seekers	<p>In this activity, students will explore how engineers design roller coasters. They will manipulate plastic tubing and a small marble to see how many loops and turns they can add to create the most thrilling ride and still get the marble to the end.</p> <p><u>Engineering Field:</u> Mechanical engineering</p> <p><u>Engineering Concepts & Skills:</u> teamwork, modeling</p>	<p>-8 foot piece of flexible plastic tubing -Set of mini marbles -Plastic wrap -Rubberbands -Activity sign and stand</p>	<p>N/A</p>	<p>1. Uses a rubber band to secure a piece of plastic wrap over one end of the tubing. This will help catch the marble.</p> <p>“SAFETY NOTE” Small marbles may pose a choking hazard to children under age 3.</p>
Tumbling Tower	<p>In this activity, students will explore how engineers keep tall structures from tumbling. They will create a tower from toilet paper rolls and cardboard. They will then follow rules for removing one tube at a time without letting the platforms fall.</p> <p><u>Engineering Fields:</u> Civil engineering</p> <p><u>Engineering Concepts & Skills:</u> Role of failure and modeling</p>	<p>-14 empty toilet paper rolls -3 12" x 12" pieces of cardboard -Activity sign and stand</p>	<p>N/A</p>	<p>No advanced preparation needed.</p>

Who Engineered It?	<p>In this activity, students will match various types of engineers to their engineered product. This will allow the students to see that most products are designed by a variety of engineers and not just one specific type of engineer.</p> <p><u>Engineering Field:</u> General engineering</p> <p><u>Engineering Concepts & Skills:</u> teamwork</p>	<ul style="list-style-type: none"> -Set of "Engineered Product" cards -Set of "Engineer Cards" -Sorting Mat -Activity sign and stand 	N/A	<ol style="list-style-type: none"> 1. Place the "Engineered Product" cards in a stack with the product photo facing up. Place the "Engineer Cards" in a stack with the photo facing up.
Wrap It Up!	<p>Students will explore how engineers choose materials for building a house based on how they react to water. Students will test various materials to decide which type of material would be best used to protect a house.</p> <p><u>Engineering Fields:</u> Materials engineer</p> <p><u>Engineering Concepts & Skills:</u> properties of materials, controlled experimentation and testing</p>	<ul style="list-style-type: none"> -Container of cotton swabs -wax paper, paper towels, aluminum foil, newspaper, heavy plastic garbage bag all cut into 3"x3" squares -Plastic container -Cookie sheet -Washable marker -Activity sign and stand 	-Trashcan	<ol style="list-style-type: none"> 1. Place water in the clear plastic container so that it is only 1/2" deep (just deep enough to cover the tip of the cotton swab). 2. Color the water by swirling open tip of washable marker in the water.