girl scouts of the colonial coast

Explore STEM Honoring Dr. Sandra DeLoatch

Dr. Sandra DeLoatch was the Dean of the College of Science, Engineering, and Technology at Norfolk State University and former Chair to the Computer Science Department. She received her Ph.D. from Indiana University, her M.S. from the College of William and Mary, her M.A. from the University of Michigan, and her B.S. from Howard University. She was a member of the Board of Zoning Appeals for the City of Suffolk and a member and past treasurer for Alpha Kappa Sorority, Inc. in Virginia Beach. She was a strong proponent of providing STEM opportunities to youth in the community. Dr. DeLoatch was a lifetime Girl Scout and former Colonial Coast Board Chair.

GUIDELINES: Based on the grid, complete the number of activities for your grade level.

	DISCOVER				CONNECT	TAKE ACTION	ANY ACTIVITY UNDER ANY KEY	TOTAL
	Science	Tech	Engineering	Math				
Girl Scout Daisy	1	1	1	1	1	1	0	6
Girl Scout Brownie	1	1	1	1	1	1	1	7
Girl Scout Junior	1	1	1	1	1	1	2	8
Girl Scout Cadette	1	1	1	1	1	1	3	9
Girl Scout Senior	1	1	1	1	1	1	4	10
Girl Scout Ambassador	1	1	1	1	1	1	5	11

DISCOVER

Science

- **S1** Space Science is an all-encompassing term that describes all of the various science fields that are concerned with the study of the Universe. Complete *How Do Probes Get to Space?* **OR** *Gravity in Action* pages in this packet.
- **S2** Chemistry is the science of matter and the changes it undergoes. To experience chemistry first hand, complete one of the activities from the chemistry page in this packet.
- **S3** Geology and Meteorology are planet and weather related sciences. Try your hand at one of the activities on the geology and meteorology pages in this packet.
- **S4** Discover the science behind the Carbon Footprint. Participate in the discussion and activities on the Carbon Footprint page of this packet.

Technology

- **T1** Read and discuss the How Technology Affects Your Life page in this packet. Select the activity suggested for your age level.
- **T2** Learn to use a Digital camera or camcorder. Use a computer photo program to create a collage of your favorite things about Girl Scouting or share your video with friends and family.
- **T3** Learn what the following computer terms mean. In a troop, each girl may want to take one word and share with the others after her research: smart device; tablet; hardware; software; Internet; WiFi; Bluetooth; URL; OS (operating system); encryption.
  OR Select one or more of the following computer programs. Research its uses and learn a little bit about how to use the program. Describe to others what it can be used for and how you would use it most often. Create a document using this program that will assist you in school (reports in Word or presentations in PowerPoint), Girl Scouts (fliers or newsletters in Word or One Note, or troop budget in Excel) or your

personal life (play your favorite movies or music in Windows media). Demonstrate your abilities for friends, family members, and/or fellow Girl Scouts. Older girls may choose to write instructions to help younger girls understand the program and its uses at their level.

- **T4** Research and list three ways technology has played a role in health care or medical advances (such as taking temperatures, prosthetics, surgery, MRI, CT scans, etc.) Ask an adult or research online to learn what these areas were like before these advances.

Engineering

- **E1** Discover the various ways that engineers are involved in developing most everything we use on a daily basis. Complete the how Engineer Scavenger Hunt activity page in this packet. Select the activity suggested for your age level.
- **E2** Complete one of the following activity pages in this packet to discover more about engineering. Girl Scout Daisies: Aluminum Boats; Girl Scout Brownies: Create a Coaster; Girl Scout Juniors: Rubber Band Racers; Girl Scout Cadettes - Ambassadors: Trebuchet Toss.
- **E3** Create a bridge using only raw spaghetti and gum drops. The goal is to make the tallest structure possible that can stand on its own (no touching or outside support) for the longest time. You may choose any design you like. When each person is finished, start the timer. As a group discuss the following: Which structures stood the longest? How were they designed? What do you think made them strongest? Would you have done anything different with your own design?
- **E4** Using the Paper Airplane activity page in this packet, investigate which planes are better for distance, precision, time aloft, and tricks.

Math

- **M1** Complete the Demonstrate 100 activity page in this packet. The number 100 is large, or is it? Just how big is 100? How much space does 100 take up? In this lesson, students think about how to measure 100. In the process, learn about the benefits of using standard units to measure length.
- **M2** Host a game night. Many games we play are based in math theory and logic. Invite your friends to play a game of connect four, Othello, chess, or even Match Game with flash cards.
- **M3** Complete at least one challenge on the Toothpick Challenge activity page in this packet.
- **M4** Create and follow a budget to use for personal use, plan your troop year, plan a special event, or take a trip. Start by setting a goal. This may be to own a particular item, to go on a trip, or to complete a community service project. Research how much it will cost. Use Little Brownie Baker goal setter materials or the sample Savannah budget page in this packet as a guide or visit your troop or family's bank website for many budgeting tips and resources. Consider product sales income, using birthday money, chores or odd job money, and parent contributions to fund your goal. (If you worked with Excel in T3, put those new skills to work by entering your budget into an Excel Spreadsheet!)

CONNECT

1. Attend a STEM-related event! Check the events page at GSCCC.org.
2. Research science-related sororities, women's associations (such as The Society of Women Engineers) or colleges in the Colonial Coast area. Invite a member, student majoring in a STEM field, or faculty to your troop to teach a hands-on lesson in one area of STEM or to help you complete activities in this packet.
3. Research and participate in one of GSUSA's National Service Projects, such as Citizen Science. Tackle it with your troop!
4. Make a list of museums or centers, in the Colonial Coast area, that offer STEM-related activities and exhibits. Visit at least one. (If they have a Girl Scout Explore Patch program, complete it while you are there!)

TAKE ACTION

1. Create a presentation to share at a school, day care, recreation center, or Girl Scout meeting or event. Share your favorite part of STEM or showcase women in STEM-related fields to help get other girls interested in the topic. You may choose to do a display board, poster, brochure, booklet, display of your patch projects, PowerPoint (a skill you may have experienced in T3), or video to show on school news or on a safe internet site.
2. Volunteer to assist younger children with STEM-related assignments in school, homework, and badge work in Girl Scout troops, or at a STEM-related Service Unit or council event. Consider assisting a younger Girl Scout troop complete this patch program; you could even do some activities together!
3. Create and run a session of STEM for Girl Scouts in your service unit. Ask adults in the field to speak and demonstrate specific skills.
4. Create a STEM-related, kid-friendly program for a local museum or organization. Be sure to speak with someone from their education department to discuss the need and content. This could be a scavenger hunt or other fun way to learn about the location that children could do with their parents when they visit.
5. Host a science fair for your troop, service unit or council. Invite girls and troops to bring projects they made while working on this patch program. (Invite the women you met in Connect #2 to be guest speakers or judges!)

Acknowledgements:

NASA trainings
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Little Brownie Bakers
AIMS Center
Wikipedia
Schuyler County Farm Bureau® Manager

STEM ACTIVITIES REFERENCE SECTION

Discover Science (S1)

How Do Probes Get To Space?

Investigate how force and thrust work to propel rockets into outer space.

Materials needed:
- Drinking Straw
- Fishing line or string (long enough to reach from one end of a room to the other)
- Long balloon
- Transparent tape
- Twist tie

Instructions:
1. Blow up your balloon. Seal the opening with a removable twist tie.
2. Tape a drinking straw lengthwise along one side of the balloon. Thread the string through the straw.
3. Attach one end of the string to a post or door handle.
4. Pull the line taut and attach the other end to an object across the room (or have a friend hold the end of the string).
5. Once the setup is complete, untie the twist tie and release your balloon.
6. Repeat the experiment, but re-string your string on an incline (tie the other end to a taller object, or have your friend hold it up higher). Release the balloon at the lower end.

What is happening?
Your balloon follows Newton's Third Law of Motion: Every action produces an equal and opposite reaction. When the air rushes out the back of your balloon, it pushes the balloon in the opposite direction. Your balloon rocket moves quite easily horizontally, but does not move as easily in a vertical direction. It needs more thrust to gain the necessary speed to overcome gravity.

Scientists would be unable to send probes (like Voyager, Magellan, and Galileo) into space without basic knowledge of the laws of physics. Certain forces and speeds are needed to break away from Earth's gravity. For a rocket to break away from the Earth's gravitational pull, it must travel at 11.2 km per second, or 25,000 miles per hour! For this reason, the probe must be launched with the help of a rocket. Rocket fuel consists of liquid hydrogen and oxygen. When the fuel is burned, the gases escape downward, thrusting the rocket upward.

Parent/Volunteer Tips
Repeat the experiment using different amounts of air in the balloon. See how far the balloon can travel on the string with different amounts of air.

Make a set up using 2 balloon rockets that face in opposite directions on the same string track. Tape a 2-foot piece of string between the two inflated balloons. Launch them simultaneously. As the balloons fight to break free of each other, ask your children to explain why the pair moves one way or the other, or simply stands still.

Gravity In Action

Explore the effects of gravity on a slowly falling object.

Materials needed:
- 3 small plastic bags (not zip-lock kind)
- Some string

- 3 small stones of different sizes.
- Masking tape

Instructions:
1. Make 3 small parachutes; each one weighted with a different size stone.
2. Cut 12 lengths of string, each 20 inches long.
3. Use a paper clip to punch four holes, equally spaced around the opening of each bag.
4. Tie a separate string into each small hole, and let the strings dangle down below the bags.
5. Use a piece of masking tape to secure the string ends to a stone.
6. Do this with each bag. Test your parachutes! 6. Next, arrange your parachutes in order; small, medium and largest stone. Take them outside.
7. Loosely wrap the string and baggy around each stone.
8. Throw each parachute up into the air and observe the time it takes for each one to reach the ground.
9. Time several tries for each parachute if you wish to get an idea about which parachute falls to the ground fastest and slowest.

What's happening?
Gravity is the universal force of attraction in space. It pulls objects with mass together, keeps planets in orbital motion, and holds you and me firmly grounded on Earth.

Gravity pulls down equally on all your falling parachutes. But each one must push against the resisting force of air molecules in the atmosphere as it travels earthward. Depending upon its size, each of your stones has a different surface area and weight! Those stones with larger surface areas and lighter weights fall at a different rate than heavier stones with smaller surface areas. Stones of equal weight, yet different surface areas will fall to earth at different rates.
Now, imagine doing the same experiment using both large and small plastic bags.

Parent/Volunteer Tips
Try to make sure that the stones are securely fastened to the parachutes with masking tape. Also, the tape itself has weight and will create a resistance to falling, so equal amounts of tape are encouraged for each parachute.

Discover Science (S2)

Chemistry

Chemistry is the science of matter and the changes it undergoes. Select and complete one of the activities below to experience chemistry first hand.

Blowing Up Balloons With CO2

Chemical reactions make for some great experiments. Make use of the carbon dioxide given off by a baking soda and lemon juice reaction by funneling the gas through a soft drink bottle. Blowing up balloons was never so easy!

Materials needed:
- Balloon
- About 40 ml of water (a cup is about 250 ml)
- Soft drink bottle
- Drinking straw
- Juice from a lemon
- 1 teaspoon of baking soda

Instructions:
1. Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
2. Pour the 40 ml of water into the soft drink bottle.
3. Add the teaspoon of baking soda and stir it around with the straw until it has dissolved.

4. Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.

What's happening?
If all goes well then your balloon should inflate! Adding the lemon juice to the baking soda creates a chemical reaction. The baking soda is a base, while the lemon juice is an acid, when the two combine they create carbon dioxide (CO_2). The gas rises up and escapes through the soft drink bottle, it doesn't however escape the balloon, pushing it outwards and blowing it up. If you don't have any lemons then you can substitute vinegar for the lemon juice.

Bubbles
1 cup water
2 tablespoons light karo syrup or 2 tablespoons glycerin
4 tablespoons dishwashing liquid

Mix together. Using string tied in a circle or other "wand", blow bubbles. See how big you can make one. Can you blow one inside another?

Cooking is Chemistry

Select a favorite bread recipe and make it with your friends and family. Do it the old fashioned way; no bread machines here! Share the loaves with a church or food pantry. Carbon dioxide from yeast fills thousands of balloon-like bubbles in the dough. Once the bread has baked, this is what gives the loaf its airy texture. Which ingredient or series of ingredients causes this? Do you know why? (Volunteers: yeast, warm water, sugar to feed the yeast and make it grow.)

Ice Cream in a Bag

Use bags to make a dairy treat
Ice cream freezes at -6 degrees C (21 degrees F). Ice cream can be made in the classroom with the understanding that the freezing point of water is actually lowered by adding salt to the ice between the bag walls. Heat energy is transferred easily from the milk through the plastic bag to the salty ice water causing the ice to melt. As it does so, the water in the milk freezes, resulting in ice cream.

Materials needed:
- ¼ cup sugar
- ½ teaspoon vanilla extract
- 1 cup milk
- 1 cup whipping cream or half & half
- Crushed ice (1 bag of ice will freeze 3 bags of ice cream)
- 1 cup rock salt (approximately 8 cups per 5 lbs.)
- 1 quart and 1 gallon size Ziploc® freezer bags
- Duct tape and bath towel

Instructions:
1. Put the milk, whipping cream, sugar, and vanilla in a 1 quart freezer bag and seal. For security, fold a piece of duct tape over the seal.
2. Place the bag with the ingredients inside a gallon freezer bag.
3. Pack the larger bag with crushed ice around the smaller bag. Pour ¾ to 1 cup of salt evenly over the ice.
4. Wrap in a bath towel and shake for 10 minutes. Open the outer bag and remove the inner bag with the ingredients. Wipe off the bag to be sure salt water doesn't get into the ice cream.
5. Cut the top off and spoon into cups.
6. Makes about 3 cups. (1 bag will serve 4 girls)

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Discover Science (S3)

Geology and Meteorology

Geology is the scientific study of the origin, history, and structure of the earth. Meteorology is the science that deals with the phenomena of the atmosphere, especially weather and weather conditions. Complete one of the activities below.

Vinegar Volcano

Use baking soda and vinegar to create an awesome chemical reaction! Watch as it rapidly fizzes over the container and make sure you've got some towels ready to clean up.

Materials needed:
- Baking Soda (make sure it's not baking *powder*)
- Vinegar
- A container to hold everything
- Paper towels or a cloth (just in case)

Instructions:
1. Place some of the baking soda into your container.
2. Pour in some of the vinegar.

What's happening?
The baking soda (sodium bicarbonate) is a base while the vinegar (acetic acid) is an acid. When they react together they form carbonic acid which is very unstable, it instantly breaks apart into water and carbon dioxide, which creates all the fizzing as it escapes the solution.

For extra effect you can make a realistic looking volcano. It takes some craft skills but it will make your vinegar and baking soda eruptions will look even more impressive!

Quick Sand

Quick sand is a fascinating substance; make some of your own and experiment on a safe scale. Amaze your friends by demonstrating how it works.

Materials needed:
- 1 cup of maize corn flour
- Half a cup of water
- A large plastic container
- A spoon

Instructions:
1. Mix the corn flour and water thoroughly in the container to make your own instant quick sand.
2. When showing other people how it works, stir slowly and drip the quick sand to show it is a liquid.
3. Stirring it quickly will make it hard and allow you to poke it quickly (it works better if you do it fast rather than hard).
4. Always stir instant quicksand just before you use it.

What's happening?
If you add just the right amount of water to corn flour it becomes very thick when you stir it quickly. This happens because the corn flour grains are mixed up and can't slide over each other due to the lack of water between them. Stirring slowly allows more water between the corn flour grains, letting them slide over each other much easier.

Poking it quickly has the same effect, making the substance very hard. If you poke it slowly it doesn't mix up the mixture in the same way, leaving it runny. It works in much the same way as real quick sand.

Make a Tornado in a Bottle

Make your own mini tornado that's a lot safer than one you might see on the weather channel. Follow the instructions and enjoy the cool water vortex you create!

Materials needed:

- Water
- A clear plastic bottle with a cap (that won't leak)
- Glitter
- Dishwashing liquid

Instructions:

1. Fill the plastic bottle with water until it reaches around three quarters full.
2. Add a few drops of dishwashing liquid.
3. Sprinkle in a few pinches of glitter (this will make your tornado easier to see).
4. Put the cap on tightly.
5. Turn the bottle upside down and hold it by the neck. Quickly spin the bottle in a circular motion for a few seconds, stop and look inside to see if you can see a mini tornado forming in the water. You might need to try it a few times before you get it working properly.

What's happening?
Spinning the bottle in a circular motion creates a water vortex that looks like a mini tornado. The water is rapidly spinning around the center of the vortex due to centripetal force (an inward force directing an object or fluid such as water towards the center of its circular path). Vortexes found in nature include tornadoes, hurricanes and waterspouts (a tornado that forms over water).

Discover Science (S4)

The Carbon Footprint

What is a carbon footprint and how do I find out what mine is?
You leave footprints when you walk in the sand, the mud and when you've got wet feet. You also leave something called a carbon footprint. You can't see your carbon footprint, but it impacts the earth and leaves a mark just like the ones in the sand and the mud do.

Carbon footprint is the amount of greenhouse gases (such as carbon dioxide) that are emitted into the atmosphere each year by a person, a household, a building or a company. These greenhouse gases trap heat within the atmosphere which could have an impact on the global climate by raising global temperatures. Why is this a problem?

Almost every activity of our daily lives contributes to our carbon footprint. This includes anything that requires burning of fossil fuels, from lighting and heating homes, schools and workplaces to having parents drive you to a soccer game or other after-school activity.

Why is it so important?
When you use fossil fuels, like heating oil to keep your house warm or gasoline for your family's car, these things create carbon dioxide, also called CO2. Carbon dioxide is called a greenhouse gas. Many scientists believe that

greenhouse gases are making the earth too warm. Your carbon footprint is the total amount of CO2 you create. A big carbon footprint is bad for the planet.

The rising global temperatures could lead to drastic climate changes such as changes in rainfall patterns (more rain in some places, less rain in others) and melting of ice worldwide which could result in a rise in sea levels. Use an internet site such as Zero Footprint Youth Calculator to calculate your carbon, energy, and water footprints. Learn how everyday decisions affect our local and global environments; including a discussion of the value of native habitats. What impact does your family's lifestyle have on the earth?

Every time you use energy that comes from fossil fuels, you create CO2 and make your carbon footprint bigger. Think of CO2 as energy waste. It's what's leftover after you use fossil fuels. You create carbon dioxide every day.

What can I do?
Understanding the concept of a carbon footprint means understanding that actions have consequences. Reducing the amount of carbon required by each person on the planet involves changing lifestyles and thought patterns. What better time to start than now? Here are some ideas to get you started:

- **What's old is new again.** Reusing existing items reduces the burden on landfills and the need to produce new things. Have your kids decorate old boxes for reuse as magazine and book holders. These new organization tools can be decorated with old wrapping paper or pictures out of magazines.
- **Get out of the car.** Make it a family activity to use bikes as an alternative to driving. The library, the soccer field and shopping are all kid-friendly destinations that will reduce fuel consumption and increase your cardio workout.
- **Black gold.** Have your kids create and maintain a compost pile. A compost pile removes organic waste from your trash and turns it into healthy fertilizer for your plants. Natural compost also eliminates the nitrous oxide (another greenhouse gas) produced by artificial fertilizers. Learn how to compost in this video from GSUSA: https://youtu.be/gqCXihLUSSY
- **Shop local.** Encourage your children to buy locally-produced products as a way to reduce the transportation burden of goods. Trips to the local farmer's market or to shops that feature toys and crafts by local artists are a good way to make the point.
- **A bulk solution.** The waste associated with school lunches can amount to as much as 67 pounds per child per year. Try buying drinks and snacks in bulk and sending them to school in reusable containers. Replace paper bags with a lunch box—better yet, have your kids make their own lunchbox!
- **BYOB.** Bring your own bags! Have your kids make or decorate reusable shopping bags. Personalized, reusable shopping bags are more likely to be used than generic alternatives. Encourage your kids to bring an empty backpack to the store so they can carry purchases home.
- **Plant a tree.** Trees absorb carbon and produce oxygen. Encourage your kids to plant a tree and be sure to explain to them the benefits of shade, beauty and carbon scrubbing the tree will provide. Check out the Girl Scout Tree Promise for more information on how to get started.

Discuss and Do:
- How many of these things do you already do?
- Which new ones do you think you would like to try?
- Draw a picture, make a brochure or poster, or just have a talk with a friend or family member to encourage others to reduce their own carbon footprint.

Discover Technology (T1)

How Technology Affects Your Life: Daisies, Brownies, Juniors

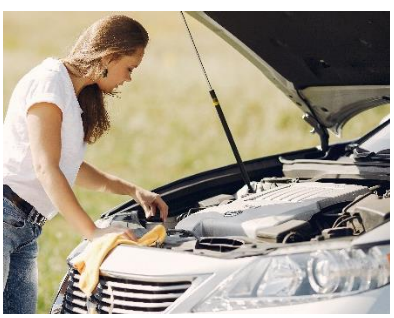
Divide the girls into small groups. Explain the following:

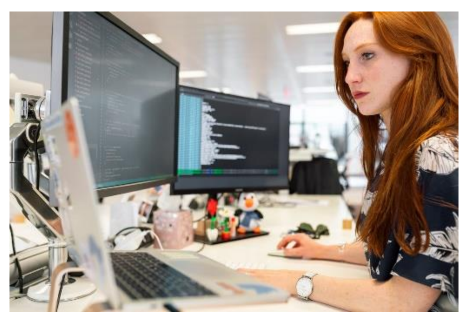
We interact with practical applications of scientific knowledge, more commonly known as technologies, on a daily basis. We wake to an alarm clock, cook breakfast on a gas-powered or electric stove, and go to school by car, bus, or bicycle. We work on computers in lighted classrooms, complete our assignments using pen and paper, and perhaps watch television or listen to music before going to sleep. Over the years, technologies have been invented to address society's problems or to fulfill its growing desire for speed and convenience. It's amazing to think that up until the last century, most people had to go outside of their homes to use the bathroom and wash up. Indoor plumbing, which is what allows you to take a bath inside your home, had only just been invented.

Though new technologies might appear radically different from the ones they're intended to replace, more often than not, the old technology remains present in the new. Take, for example, a flashlight. It's superior to a candle in some respects: A match isn't needed to make it work, it won't set fire to other things, and it projects light farther. But essentially, a flashlight, like a candle, is still just a source of light. While you may be able to use any number of technologies without knowing what makes them tick, exploring their inner workings might encourage you to develop new uses for them, or even invent new technologies to improve them. When you look closely at computers, for instance, they're not much more than pieces of metal, plastic, and circuitry. It's a wonder that these parts—each of them not capable of much on their own—work together to enable us to do schoolwork, operate traffic signals, control aircraft in flight, and design so many of the products we use.

One by one look at the images below and discuss the following:

1. Try to imagine what life was like before the technology in the image was invented. Does this technology allow you to do something that you couldn't do before?
2. Pick another image. Do you think this technology has improved people's daily lives? In what ways?
3. Does this technology have any disadvantages?
4. Can you think of an object in your house that makes your life easier? Describe how it helps you in everyday life.
5. Why do you think people modify existing inventions or invent new things or ways of doing them?
6. Who develops and modifies inventions?






How Technology Affects your Life: Cadettes, Seniors, Ambassadors

Read and discuss the following with the girls:
Think about the devices you have in your home—a refrigerator or a television, for instance, or possibly a personal computer. How would your life be different if you didn't have these? Innovations in technology introduce new products and services to many of our homes, with the power to affect the way each of us lives our life. In many cases, these devices are developed as a response to society's changing needs. But they also reflect and even shape the values held by a society: a wish for more convenience or durability, or for something smaller, safer, and easier-to-use. Often, new technologies begin as luxury items and are available to the few who can afford their high initial price. But over time, as the costs to develop and manufacture them decrease, they become more widespread. The television is an excellent example of this phenomenon, as is the mobile phone.

Rapid technological change, as evidenced in household devices over the past century, has often been accompanied by major social changes. Although it often promises a better quality of life to everyone, technology and the change it brings about actually frightens some people. Still others are concerned that much of the change may not really be for the better. New technologies—or modernizations of existing ones—often begin as attempts to solve specific problems. But sometimes they happen unexpectedly. An American engineer named Percy Spencer was researching radars for military use at the end of World War II when he noticed something unusual. While testing a new kind of vacuum tube that emitted a certain frequency of radio waves, a candy bar he kept in his pocket melted. Curious about why this had happened, Dr. Spencer tried another experiment: placing popcorn kernels near the vacuum tube. When the kernels began to pop, the first microwave oven was born—completely by accident.

Encourage the girls to discuss technology with one another using these questions to get the conversation started.

1. Have the girls pick one technology and describe how its development has changed the way people live.
2. How do you think people kept food from spoiling before refrigeration?
3. Have you used or seen any older items in your house or the home of a relative? How are they different to newer versions?
4. What changes in size do you notice in various technologies?
5. Many of the items we have discussed are for entertainment. How have these items impacted our lives?

Discover Engineering (E1)

Engineer Scavenger Hunt: Daisies, Brownies, Juniors

Look around the room and find examples of items that are developed by engineers. Determine what type of engineer developed the item and write the name of the item under the correct type of engineer.

Chemical	Civil	Electrical	Industrial	Mechanical

Chemical engineering the design, construction, and operation of plants and machinery for making such products as acids, dyes, drugs, plastics, and synthetic rubber by adapting the chemical reactions discovered by the laboratory chemist to large-scale production. The chemical engineer must be familiar with both chemistry and mechanical engineering.

Civil engineering planning, designing, construction, and maintenance of structures and altering geography to suit human needs. Some of the numerous subdivisions are transportation (e.g., railroad facilities and highways); hydraulics (e.g., river control, irrigation, swamp draining, water supply, and sewage disposal); and structures (e.g., buildings, bridges, and tunnels).

Electrical engineering encompasses all aspects of electricity from power engineering, the development of the devices for the generation and transmission of electrical power, to electronics. Electronics is a branch of electrical engineering that deals with devices that use electricity for control.

Industrial engineering designs methods, not machinery.

Mechanical engineering design, construction, and operation of power plants, engines, and machines. It deals mostly with things that move.

Engineer Scavenger Hunt: Cadettes, Seniors, Ambassadors

Choose one engineering field and discover what they focus on. Answer the following questions and be prepared to present your findings to the rest of the troop.

Aeronautical Engineering
Architectural Engineering
Audio Engineering
Automotive Engineering
Biomedical Engineering
Chemical Engineering
Civil Engineering
Computer Engineering
Design Engineering
Electrical Engineering
Electronic Engineering
Environmental Engineering
Forensic Engineering
Industrial Engineering
Manufacturing Engineering
Marine Engineering
Mechanical Engineering
Model Engineering
Nuclear Engineering
Ocean Engineering
Petroleum Engineering
Software Engineering
Sound Engineering
Structural Engineering

1. Type of engineering field chosen:
2. What does this type of engineering field focus on?
3. What type of education does the engineer in this field have to have?
4. Name five everyday items this engineer works with that affect your daily life?
5. Research and locate any local business that employs this type of engineer. List at least two companies.
6. How does this type of engineering field help improve our daily lives?
7. How does this engineering field use math, science and technology to do their job?

Discover Engineering (E2)

Aluminum Boats: Daisies

Test the buoyancy of an aluminum foil boat and an aluminum foil ball.

Materials needed:
- Small bucket or large bowl or dish pan
- Water
- 20 coins of the same weight
- Aluminum foil
- Ruler
- Scissors

Instructions:
1. Fill the bucket with water.
2. Using the ruler to make measurements, cut two 15-cm (6-inch) squares from the aluminum foil.
3. Wrap one of the squares around 10 pennies and squeeze the foil into a tight ball.
4. Fold the four edges of the second square up to make a small boat.
5. Place 10 pennies in the boat.
6. Make sure you seal each corner tightly so water cannot leak into the sides from below the boat.
7. Set the boat on the surface of the water in the bucket.
8. Place the ball on the surface of the water.

What's happening?
When you dropped the ball of aluminum foil in the water, it had a completely different result than the boat. Although both pieces of aluminum foil have the same weight, the ball takes up a smaller space than the boat. The amount of water pushed aside by an object equals the force of water pushing upward on the object. The larger boat pushes more water out of the way than the ball and creates enough upward force to cause it to float.

Parent/Volunteer Tips
Measure and cut out two more pieces of aluminum foil. Take one sheet of aluminum foil and design a boat that has a different shape than your original. Make a third boat using the other piece of aluminum foil. You can try making a circle, square or rectangle shaped boat. Also try one making one with high side barriers and one with low side barriers. Now see which boat can hold the most pennies without sinking. You should see a distinct difference in the amount of pennies each boat can hold before sinking. If you see a mistake in your ship that can be corrected to make it more buoyant, simply take it out of the water, fold it flat, dry it off and make it again. You should be able to use the aluminum foil over and over if you dry it off and handle it with care. You can also try using heavier objects on your boat.

Create a Coaster: Brownies

Mechanical engineers frequently work at amusement parks and design rides of all types. At the conclusion of the activity are some roller coaster milestones that might be of interest to students. Forces and motion are an important part of most types of engineering, mechanical engineering most specifically. Students use plastic tubing and small spherical objects like ball bearings, marbles, and air beads to first create a successful roller coaster then experiment with various design challenges.

Materials needed:
Instructor needs:
- One rubber band
- A large sheet of paper/marker
- Two equal size, clear cups with water in one
- stopwatch

Each group will need:
- One piece of plastic tubing, diameter at least ½inch (1 inch preferred), length at least 10 feet
- One spherical object of varying size – ball bearing, marble or air bead. Distribute one at a time; groups may exchange for a different type or size during the activity.

Caution the girls not to put the tubes in their mouths to blow on them; this will ruin the activity for them as condensation collects in the tube and will significantly slow their "car."
Caution the girls not to throw the bearings and to have one person designated as a "catcher" at the end of the roller coaster so that the bearings do not get lost.

Introduction
Introduce potential and kinetic energy.
1. Tell the girls that potential energy is the energy of "what *could* happen."
2. Quickly take a rubber band from your pocket and stretch it as if you will fire it at someone. When they flinch, ask them why. Because the rubber band *could* hit them, if you let it go. It has potential energy.

3. Shoot the rubber band at the ceiling. Tell them that while it is moving, it has kinetic energy, the energy of motion.
4. Ask girls whether they have ever ridden or seen a roller coaster. Ask them to recall that all roller coasters have hills, and the first one usually involves the cars being dragged up via some sort of connection to a chain and a motor (make the *click, click, click* noise to invoke their memory). Use guided inquiry questions about their experiences with roller coasters to let the group tell you how they work. Note that most roller coasters have the highest hill as the first one. The motor puts energy into the system (what kind of energy?).
5. Tell the girls that roller coasters, when the motor has pulled them to the top of the first hill, pause there to let everyone get nervous, and actually stop moving for a short time. Ask the girls what kind of energy the car in position one has. Make sure they understand that the car is not moving. Get them to say potential and discuss why there is no kinetic.
6. Emphasize that it is at the bottom of the hill and moving fast.
7. Using the cups, have water in one. Slowly pour the water into the other cup.
8. Tell the girls that there is a concept called conservation of energy that says energy is neither created nor destroyed, just transformed. Tell them that, in a roller coaster, potential energy comes from the energy of the motor dragging the car up the first hill. Then the energy converts to kinetic energy (which means speed), as the car goes down hills. That is what happened when the water was poured from one cup to another, just like the car going down one hill. When the car goes up the *next* hill, it is like water being poured from the second cup back into the first.
9. Ask the girls: If the next hill isn't as tall as the first hill, what happens? Answer: the car retains some speed as it goes over the hill, like some water remaining in the cup as you pour back and forth. Show them this with water. Say: This means, that unless something else goes on, the roller coaster could be infinitely many hills (or a circle of hills) all the same size, with the car going down, then up until it just loses all its speed, then back down. Ask them if this could really happen. If not, then something must happen to the energy, because it cannot be just destroyed or lost.
10. Ask them if they have heard of friction. Tell them to rub their hands together quickly and see what happens. (They get warm.) This is friction converting mechanical energy to heat. This happens in the roller coaster too. Demonstrate with the water by, while pouring back and forth, spilling a little water on the floor. Then ask if a second hill could be as tall as the first; in other words, is there enough water (energy) to get the car back up as far? The answer is no, because some energy was converted to heat through friction.

Procedure

1. Put the girls into groups of 3 or 4.
2. Tell each group that they will have a tube and one roller coaster car (ball bearing) at a time.
3. Ask them to build a successful roller coaster: the ball goes in one end and comes out the other without their moving the tube. If they want to try different sizes of ball bearings, they can trade theirs in as many times as they like, but may only have one at a time.
4. Give them five minutes to do this, then get the girls attention and ask each group to share one thing they have learned.
5. Tell them they have ten minutes to make the craziest roller coaster that they can. Encourage them to include twists and turns and inversions. They should name it and be prepared to demonstrate it to the class. While they build, circulate and ask them questions about what they are doing. Look for difficulties in teamwork (not including everyone, not trying everyone's ideas, etc.) and for frustrations with making things work. Ask questions or make small suggestions to help.
6. Additional challenges might include asking the students to build the curviest roller coaster that they can, or asking the groups to design the slowest roller coaster that they can. You can time the teams and compete if you wish.
7. Have each group tell the coaster name and "operate" their roller coaster for the group.

Discuss

1. Ask them if different sizes of ball bearing made a difference.
2. Ask them if they succeeded in making a loop. Would it matter if the loop was at the beginning or end of the coaster?

3. Ask them if they saw friction playing a role and how.
4. Fundamentally, the students should understand that height and speed trade off with one another in a roller coaster.
5. Ask them about this trade and reiterate the concepts of potential (height) and kinetic (speed) energy.

Rubber Band Racers: Juniors

The Rubber Band Racers lesson explores the design of rubber band powered cars. Girls work in teams of engineers to design and build their own rubber band cars out of everyday items. They test their rubber band cars, evaluate their results, and present to the group.

Materials needed:

- 16 x 16 piece of corrugated cardboard or cereal box
- 4 CDs
- paper plates, or plastic lids
- 4 rubber bands
- 3 unsharpened pencils
- 4 metal paperclips
- 1 package of thumb tacks
- Scissors
- masking tape
- meter stick

Instructions:

1. You are a team of engineers who have been given the challenge to design your own rubber band car out of everyday items. The rubber band car needs to be able to travel in a straight line for a distance of at least 3 meters within a 1 meter wide track. The car that can travel in a straight line for the farthest distance is the winner.
2. Divide girls into groups of 3-4, providing a set of materials per group.
3. Explain that girls must develop a car powered by rubber bands from everyday items, and that the rubber band car must be able to travel in a straight line for a distance of at least 3 meters within a 1 meter wide track. Rubber bands cannot be used to slingshot the cars. The car that can travel in a straight line for the greatest distance is the winner.
4. Girls should now be allowed to develop a plan for their rubber band car. They agree on materials they will need, write or draw their plan, and then present their plan to the group.
5. Groups may trade unlimited materials with other teams to develop their ideal parts list.
6. Groups next execute their plans. They may need to rethink their plan, request other materials, trade with other teams, or start over.
7. Next, teams will test their rubber band car. To ensure that the rubber band cars travel in a straight line, students can create a 1 meter wide track using masking tape on the floor.
8. Girls then complete an evaluation/reflection worksheet below, and present their findings to the whole troop.

Design

Meet as a team and discuss the problem you need to solve. Then develop and agree on a design for your rubber band car. You'll need to determine what materials you want to use. Draw your design in the box (or on another sheet of paper), and be sure to indicate the description and number of parts you plan to use. Present your design to your troop or group. You may choose to revise your teams' plan after you receive feedback from other girls.

Construction

Build your rubber band car. During construction, you may decide you need additional materials or that your design needs to change. This is ok – just make a new sketch and revise your materials list.

Testing
Each team will test their rubber band car. Your rubber band car must travel in a straight line for 3 meters within a 1-meter wide track. Calculate your car's velocity (distance traveled per unit of time). Complete three tests and record the information below. Average your three tests to determine the average for data for your car.

Rubber Band Car Data

Rubber Band Car Data Test 1

Distance Traveled within Track (m)_____________

Time Traveled within Track:___________________

Velocity m/s________________________________

Rubber Band Car Data Test 2

Distance Traveled within Track (m)_____________

Time Traveled within Track:___________________

Velocity m/s________________________________

Rubber Band Car Data Test 3

Distance Traveled within Track (m)_____________

Time Traveled within Track:___________________

Velocity m/s________________________________

Rubber Band Car Data Average

Distance Traveled within Track (m)_____________

Time Traveled within Track:___________________

Velocity m/s________________________________

Evaluation

Evaluate your teams' results, complete the evaluation worksheet, and present your findings to the group. Use this worksheet to evaluate your team's results.

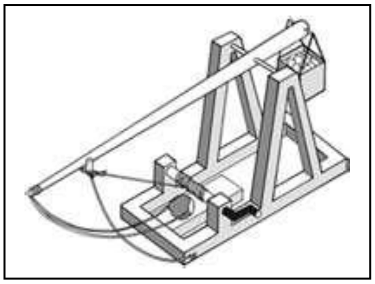
1. Did you succeed in creating a rubber band car that traveled in a straight line for 3 meters within the track?
   If so, how far did it travel?
   If not, why did it fail?
2. Did you negotiate any material trades with other teams? How did that process work for you?
3. What is the maximum velocity your car achieved?
4. Did you decide to revise your original design or request additional materials while in the construction phase? Why?
5. If you could have had access to materials that were different than those provided, what would your team have requested and why?
6. Do you think that engineers have to adapt their original plans during the construction of systems or products? Why might they?
7. If you had to do it all over again, how would your planned design change? Why?
8. Do you think you would have been able to complete this project easier if you were working alone? Explain.

Trebuchet Toss: Cadettes, Seniors, Ambassadors

Teams of girls design and build a trebuchet out of everyday materials. The trebuchet must be able launch a mini marshmallow with enough accuracy to land on a pie tin. The objective is to launch the marshmallow onto the pie tin from as great a distance as possible.

Materials needed:

- 20 plastic drinking straws
- 20 unsharpened pencils
- 20 popsicle sticks
- 10 rubber bands
- 5 toothpicks
- 5 paperclips or craft wire
- Masking tape



- String
- Scissors
- 5 metal washers
- Small piece of cloth
- Meter stick or measuring tape
- Mini marshmallows
- Pie tin or paper plate

Instructions:

1. Divide girls into groups of 2-3 girls, providing a set of materials per group.
2. Explain that girls must develop their own working trebuchet from everyday items. They must test whether their trebuchet can launch a mini marshmallow to accurately land on a pie tin. They must also test their trebuchets to find the maximum distance at which they can hit the target. The trebuchet that can hit a pie tin from the farthest distance possible is the winner.
3. Girls will meet and develop a plan for their trebuchet. They agree on materials they will need, write or draw their plan, and then present their plan to the group.
4. Teams may trade unlimited materials with other teams to develop their ideal parts list.
5. Teams next execute their plans. They may need to rethink their plan, request other materials, trade with other. Girls should record their results measuring both the distance the projectile was launched as well as the distance the marshmallow landed from the target.
6. Girls then complete an evaluation/reflection worksheet, and present their findings to the group.

History and Mechanics of the Trebuchet
A trebuchet is a type of catapult that was used during the Middle Ages to launch projectiles during battle. Trebuchets can be distinguished from other types of catapults in that they do not use stored tension (such as in twisted ropes or flexed wood) to launch objects. Projectiles launched by trebuchets included rocks for smashing through castle walls, venomous snakes, beehives, and even dead animals to spread disease. Since trebuchets required aiming, they were typically used to hit stationary targets such as buildings, walls, and even other trebuchets. A trebuchet has much better accuracy than other types of catapults. Trebuchets were effective during battle because they could be set up a safe distance away from a castle, and the archers guarding it, while still causing significant amounts of damage. Many castles also had trebuchets inside their walls to launch projectiles at their enemies. Since trebuchets had the ability to launch objects very far into the air they could do so from behind castle walls without being seen. A sturdy trebuchet could launch a projectile weighing 300 pounds over 300 yards!

There are two basic types of trebuchets: a traction trebuchet and a counterweight trebuchet. Both the traction trebuchet and the counterweight trebuchet consist of a base, an arm and a sling. The base of the trebuchet is what provides the support to the device. Oftentimes, the base of the trebuchet is on wheels for mobility. The arm of the trebuchet is essentially a long beam on a pivot that acts as a lever to fling the projectile. A sling holds the projectile in place at the long end of the arm (farther away from the pivot). The sling could be a pouch that holds the projectile in place. The sling could also consist of a rope which is attached to the projectile and then loosely tied to a release pin at the end of the arm. The rope is designed to slide off the release pin when the arm swings around. In a counterweight trebuchet, a counterweight is attached to the short end of the arm, closer to the pivot. The traction trebuchet on the other hand relies on people pulling down on the short end of the arm with ropes.
In addition to his numerous accomplishments, Archimedes is considered to be the first person to explain the principles behind levers. Based on his findings he was quoted saying “Give me a place to stand, and I will move the Earth.” Levers are one of the six types of simple machines. A lever is a rigid object that is used with a fulcrum or pivot point to increase the amount of mechanical force applied to an object. A trebuchet is considered a class 1 lever. In a class 1 lever the force is applied to one end of the arm, the load on the other end, and a pivot point or fulcrum is in the middle. A playground see-saw is also a class 1 lever.

In a trebuchet the force (counterweight) is much greater than the load (projectile). The fulcrum or pivot point on a trebuchet is not directly in the middle as it is in a see-saw. Here, the pivot point is closer to the counterweight or the end where the force is being applied.

Mechanical advantage is the factor by which the force or torque put into a mechanism is multiplied. We can calculate the mechanical advantage of any simple machine by dividing the output force by the input force. Another way to calculate the mechanical advantage of a lever is by dividing the length of the effort arm (distance between the fulcrum and the force) by the length of the resistance arm (distance between the fulcrum and the load or projectile).

$$MA = \frac{\text{Output force (at load)}}{\text{Input force (applied)}} \qquad MA\ lever = \frac{\text{Length of Effort Arm}}{\text{Length of Resistance Arm}}$$

Work is how much energy is transferred by a force acting over a distance. The formula for work is $W = F \times D$. The greater the mechanical advantage the less force required, but it must be applied over a greater distance. The amount of work does not change.

Design

You are a team of engineers who have been given the challenge to design your own trebuchet out of everyday items. The trebuchet should be designed to launch a marshmallow so it can land on a pie tin from as far a distance as possible. The trebuchet that can accurately hit the pie tin from the greatest distance is the winner. You may use the materials, which have been provided to you, but the rubber bands may not be used to power the arm or slingshot the marshmallow.

- Meet as a team and discuss the problem you need to solve. Then develop and agree on a design for your trebuchet. You will need to determine what materials you want to use.
- Draw your design in the box below (or on a separate sheet of paper), and be sure to indicate the description and number of parts you plan to use. Present your design to the group.

You may choose to revise your teams' plan after you receive feedback from the group.

Design   **Materials Needed**

Construction Tip: You may want to experiment with the weight of your counterweight, sling length, and the placement of your arm's pivot point. During construction, you may decide you need additional materials or that your design needs to change. This is ok – just make a new sketch and revise your materials list.

Testing
Your object is to launch a marshmallow as far a distance as possible and land on he pie tin target. Be sure to watch the tests of the other teams and observe how their different designs worked.

Trebuchet Test Results

	Projectile Distance	Distance From Landing Target
TEST 1		
TEST 2		
TEST 3		
AVERAGE		

Evaluation
Evaluate your teams' results, complete the evaluation worksheet, and present your findings to the group. Use this worksheet to evaluate your team's results in the Trebuchet Toss Lesson:

1. Did you succeed in creating a trebuchet that could launch a marshmallow to accurately land on a pie tin? If so, what was the maximum distance achieved? If not, why did it fail?
2. Did you decide to revise your original design or request additional materials while in the construction phase? Why?
3. Did you negotiate any material trades with other teams? How did that process work for you?
4. If you could have had access to materials that were different than those provided, what would your team have requested? Why?
5. Do you think that engineers have to adapt their original plans during the construction of systems or products? Why might they?
6. If you had to do it all over again, how would your planned design change? Why?
7. What designs or methods did you see other teams try that you thought worked well?
8. Do you think you would have been able to complete this project easier if you were working alone? Explain.
9. How might you measure the maximum height your trebuchet could launch a marshmallow? Try it!

Discover Engineering (E4)

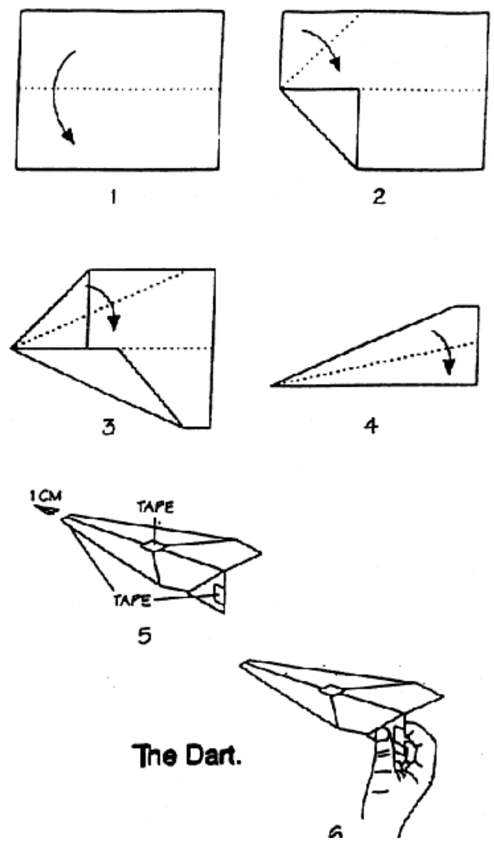
Paper Airplane

Discover the engineering aspects of an airplane and flight. Discover which plane designs are better for distance, time, and tricks.

Materials needed:
- 3-6 sheets of plane paper per girl
- 1 small paperclip per girl
- Scissors
- Scotch tape

Instructions:

1. Each girl should make a paper airplane using the diagrams below. Stand at a preset starting line and fly the plane with a friend marking the distance, number of turns or loops it makes and the amount of time it was in the air.
2. Repeat with a new airplane. This time, add a paperclip to the end of the plane. Again, stand at the preset starting line and have the friend mark the distance, number of turns or loops, and the amount if time it was in the air.
3. Make a third airplane. This time, make flaps at the back of the plane. Flaps are made by cutting four slits on the rear edge of the wings and folding the slotted portion up. Standing at the starting line, have your friend mark all of the same things as the first two test flights.
4. Using the planes you already made, stand at the starting line and throw each, one at a time, aiming for a preset target. This could be a point on the wall, a bowl on a chair, anything you like.



Discuss

Which plane flew further?
Which plane higher?
Which plane made curves?
Which plane stayed in the air the longest time?
Which plane got closet to your target in #4?
Which was your favorite plane and why?

For fun, you may want to put your best plane in a competition with planes your friends make!

Discover Math (M1)

Demonstrate 100

Materials needed:

- Various objects in sets of 100 that can be laid flat and used to measure length (for example, paper clips, pencils, pieces of paper, etc.). If possible, you may want to include several colored objects of each type to serve as temporary measurement markers.
- Index cards
- Masking tape

Instructions:

1. Tell the girls that they will be exploring how to measure to 100. Ask them to begin the lesson by sharing their ideas about the number 100. How big is 100? How would you measure 100? What kind of object or structure might be 100 big or 100 long?
2. Divide girls into pairs. Tell them that you are planning to put up a temporary wall to separate off one section of the classroom. You want the wall to be 100 long. Ask the girls to use one of the materials that you have provided, or some part of their body—such as hands or feet—to mark off

how long the wall will be. All pairs should start from the same place (a common wall) to measure the space needed for the new wall.

3. You may want to provide girls with a temporary method for keeping track of their count. For example, if they are using paper clips, they can use a colored paper clip to mark every 10 or 25 in the count. If they are using their hands or feet, they can use small pieces of masking tape or colored sticky notes to mark every 10 or 25 measurements.
4. After each pair has lined up 100 items, give them a piece of masking tape to mark their end point. The temporary markers can be removed at this time, so the only markers that remain are the end points. Have the pairs write down on an index card which 100 materials they used and then tape a sample or picture of this object (their unit of measure) onto the card. They can then attach the index card to their masking tape on the floor.

- Bring the groups back together and have everyone look at the different measurement marks on the floor. Discuss with girls what they notice about the marks. Girls should notice that 100 can look very different depending on what objects or units you use. Then discuss the following questions:
    - What would happen if you asked someone else to measure 100 for a new wall? Would they reach the same spot that you did?
    - How would you tell another group to measure 100 so that they would reach the exact spot that you did?
    - What if they didn't have the same materials (or had different-sized hands or feet)?

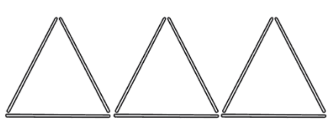
Discuss
Lead the discussion to the idea that agreed-upon "units" of measure are important because they tell you what a quantity represents. A length of 100 (or any number) is meaningless unless you know what the unit of measurement is. And in order to have that unit be useful to others, it is important that it is the same for everyone who uses it, whether it is inches and feet or centimeters and meters.

Discover Math (M3)

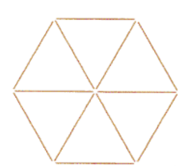
Toothpick Challenge

Using logic and the provided number of toothpicks, complete at least one of the challenges below.

Three to Five
Your challenge in this puzzle is to move exactly 3 toothpicks in the following arrangement to make 5 triangles. Good luck!

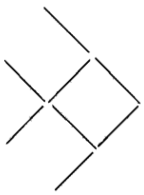


Transforming by Twos
Arrange 12 toothpicks on a flat surface to form the shape shown at right.



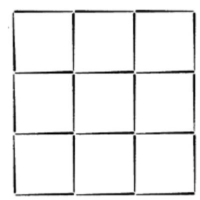
Remove two toothpicks to leave exactly four congruent triangles.
Remove two toothpicks to leave three congruent triangles and two congruent parallelograms.
Remove two toothpicks to leave two congruent triangles and two congruent parallelograms.
Remove two toothpicks to leave exactly three congruent triangles and a parallelogram.

Flipping Fish
Arrange eight toothpicks in the shape of a fish. Move toothpicks until the fish is facing another direction. How many did you move?



Try to get the fish to change directions by moving fewer toothpicks than you did the first time. What is the minimum number of toothpicks that must be moved to make the fish face another direction?

Reducing Squares
Arrange 24 toothpicks as shown at right.



Reduce the number of squares to two by removing eight toothpicks.
Reduce the number of squares to five by removing four toothpicks.
Reduce the number of squares to five by removing eight toothpicks.
Reduce the number of squares to nine by removing four toothpicks.

Get Creative
Create a toothpick challenge of your own, and give it to a friend to solve.

Discover Math (M4)

Budget Time

Budgets are not just ways to make your money last. They're the way companies, families, and Girl Scout troops figure out how much money they have, how much money they'll need, and how they can earn, or save that money so they can do all the things they want to do. Use the resources below to develop your own personal or troop budget.

Visit littlebrowniebakers.com, check out their materials for goal setting and developing a budget.

With an adult, visit your family's bank online and search for kid and teen friendly budgeting resources. For example, Wells Fargo has Hands on Banking tips for parents, teachers, and kids.

Sample Trip to Savannah

	Fee	# People	Total
Admission - Girls	$325.00	14	$4,550.00
Admission - Adults	$350.00	8	$2,800.00
		TOTAL	**$7,350.00**

Meals	$100.00	22	$2,200.00	
Birthplace	$22.00	25	$550.00	
First Headquarters	$10.00	24	$240.00	workshop participants
First Headquarters	$3.00	1	$3.00	non-participants
Trolley Tour - Girls	$9.00	14	$126.00	Old Towne Trolley
Trolley Tour - Adults	$22.25	9	$200.25	Old Towne Trolley
Van Rental			$1,129.50	Avis
Fuel	$300.00	2	$600.00	489 miles one way + around town; $2.60/gal; 10 - 12 mpg
Parking Passes	$9.00	4	$36.00	2 per vehicle
Lodging			$1,725.00	Savannah Getaways rental house
Awards, Patches	$8.00	22	$176.00	Birthplace Pin $3; Patch $2; Head quarter Award $3
Scrapbook & project supplies	$10.00	22	$220.00	
T-shirts	$8	23	$184.00	Tasty Shirts
Extended Trip Insurance			$26.68	Plan 3E

TOTAL **$7,389.75**

BALANCE **-$39.75**

To order patches visit the GSCCC shop.