

# Introduction to the Junior Think Like an Engineer Journey

This is an UNOFFICIAL rewrite of the Junior Think Like an Engineer Journey found in the VTK. Formatting was added for easier reading, and it was condensed to save paper when printing. It does not include any meeting structure like a flag ceremony, reciting the GS Promise & Law, or a Friendship Circle so that you can customize it for your own meeting. Before starting, read the referenced handouts located in the Appendix:

- **Junior Think Like an Engineer Journey Materials List:** Each meeting has its own materials list, but you can use this handout if you like to do all your supply shopping at one time. It includes all materials needed for the entire Journey.
- **Junior Think Like an Engineer Journey Glossary:** This is a list of words that Juniors may not know and how to define them.
- **Think, Pair, Share:** These facilitation tips will help you make sure that every girl's voice is heard during brainstorming activities.
- **Take Action Guide:** This handout explains the difference between Take Action and Community Service. It also includes tips to make a project sustainable and Take Action project ideas that you and your troop can use as inspiration.
- **Design Thinking Process Poster**
- **Examples of Shelters**
- **Ring of Fire Map**
- **How to Build a Shake Table**
- **Junior Think Like an Engineer Journey Survey**



Juniors earn two awards -Think Like an Engineer award and the Take Action award following the completion of the Take Action project and Journey in **Think Like an Engineer Part 6**.

## Notes for Volunteers:

**Use the Talking Points (But Make Them Your Own):** In each session, you'll find suggested talking points under the heading "SAY." Some volunteers, especially new ones, find it helpful to follow the script. Others use the talking points as a guide and deliver the information in their own words. Either way is just fine.

**Be Prepared (It's What Girl Scouts Do!):** Each meeting includes a "Prepare Ahead" section that includes a materials list and what kind of set-up is required. Read it in advance so you have enough time to gather supplies and enlist help, if needed.

**Use Girl Scouts' Three Processes:** Girl-led, learning by doing, cooperative learning--these three processes are the key to making sure Juniors have fun in Girl Scouts and keep coming back.

"Learning by doing" and "cooperative learning" are built into this Journey, thanks to the hands-on activities and tips. You'll also find specific "keep it girl-led" tips in the meeting plans. They'll help you create an experience where Juniors know they can make choices and have their voices heard.

**Fail Fast. Succeed Sooner:** That's how engineers solve problems. On this Journey, Juniors will learn the Design Thinking Process through hands-on activities. They'll learn to: Brainstorm ways to solve a problem, design prototypes, test them to see what does and doesn't work, then improve their designs. To

engineers, failure is a good thing because every time a design fails, you learn something and can make it better.

You can help Juniors think this way. When a Junior's prototype doesn't work, ask questions like, "Why do you think it didn't work? How can you change your design? Try again--that's what engineers do!" This approach also keeps the activity girl-led and fun because Juniors are free to invent things without feeling the pressure to make them perfect.

**Leave Time for the Closing Ceremony:** If Juniors are having fun doing a Design Challenge, you may be tempted to skip the Closing Ceremony so they can keep going--but the Closing Ceremony is absolutely key to their learning. Here's why:

When Juniors leave a meeting, they'll remember how much fun it was to build something out of cardboard or make a Ping-Pong ball fly across the room. However, they may not realize that they just learned how engineers solve problems or that they're good at engineering--unless you tell them.

That's why the Closing Ceremony is so important. It's where you can connect the dots for Juniors by:

- Pointing out how they acted as engineers. (**For example:** They did rapid prototyping. When one of their prototypes didn't work, they saw that "failure" as helpful feedback and tried something else. They worked together to find solutions. They shared their designs and offered suggestions.)
- Reminding Juniors that they are already engineers--and that it's fun to solve problems using engineering.
- Letting them know that they have what it takes to continue exploring STEM.

These simple messages can boost Juniors' confidence and interest in STEM--and end the meeting on an upbeat note!

**Tell Your Troop Story:** As a Girl Scout leader, you're designing experiences that Juniors will remember their whole lives. Try to capture those memories with photos or videos. Juniors love remembering all they did--and it's a great way for parents to see how Girl Scouting helps their Juniors.

And please do share your photos and videos with GSUSA by emailing them to [STEM@girlscouts.org](mailto:STEM@girlscouts.org) (with photo releases if at all possible!).

**Program Pairing:** The Junior Product Designer badge goes well with this Journey!

## Junior Think Like an Engineer Journey Part 1

*Overview: Juniors learn how engineers use the Design Thinking Process to solve problems and do a hands-on Design Challenge where they build a paper structure strong enough to support the weight of several books.*

### Activity 1: As Girls Arrive: Engineers Create

#### Materials

- Magazines and catalogs that focus on science and technology or ones that include products, such as cars, devices, architecture, gadgets, etc.
- Scissors

- Poster board (one--for all Juniors to post pictures)
- Glue

### Steps

Welcome Juniors and ask them to cut out pictures of things they think were designed or created by an engineer.

**Suggested conversation:** *You're about to learn what engineers do and how they solve problems. Cut out photos of things you think were designed by an engineer. Stick your photos up on the poster board.*

## Activity 2: Opening Ceremony: Jump into Design Thinking!

### Materials

- **Design Thinking Process poster**

### Steps

Introduce Juniors to engineering and the Design Thinking Process as the way engineers solve problems.

**Suggested conversation:** *On this Journey, you'll find out what engineers do and how they help people. Who knows what engineers do?*

*Engineers use their imaginations to solve problems. They invent and build things that can be used in the real world. Every day you see a problem an engineer has solved. For example, engineers design bridges so your car can cross a river. They design planes so you can fly to another place. They design really tall buildings for lots of people to work or live in. When you arrived, you cut and pasted photos of things you think an engineer created. Share what you cut out and explain why you think an engineer designed it.*

Show Juniors the **Design Thinking Process poster**.

**Suggested conversation:** *You are going to learn how to solve problems and think like an engineer. These are the steps engineers use to solve problems. They find a problem. They brainstorm different ways to solve it. They choose one idea and design it. They test their design to see if it works. And they keep working on it until it does. To an engineer, failure is a good thing because every time a design fails, you learn something and can make it better.*

## Activity 3: Design Challenge: Paper Structure

### Materials

- **Design Thinking Process poster**

For each pair of girls:

- Masking or duct tape
- 8 sheets of newspapers
- Four or 5 heavy books
- 1 piece of cardboard (about the size of a piece of copy paper); use it as a platform for the books.
- Twelve-inch ruler to measure height of the structure
- Paper and pencil

## Steps

**Note:** Give Juniors 10- and 5-minute warnings so they can wrap up in time for the Closing Ceremony.

Juniors break into pairs to design and build a stable structure out of paper that can support the weight of several heavy books.

### Set up the Design Challenge.

**Suggested conversation:** *One of the things engineers do is to build structures out of materials. Can you think of some materials they use to build things? (Girls may say: Steel, wood, plastic, concrete, iron, etc.) Your challenge is to design and build a structure out of paper that is strong enough to support the weight of these books.*

Pass books around so Juniors can feel their weight.

### Brainstorm and Design

Divide Juniors into pairs to design and build their Paper Structure prototype.

**Suggested conversation:** *Communities all over the world need to build structures--like homes, schools, towers and dams--that are sturdy and stable. But sometimes they don't have building materials that are very strong. One way to make a material stronger is to change its shape.*

Demonstrate how to make paper stronger by showing girls how to roll newspaper into a tight tube shape. Start at one corner, rolling diagonally toward the other, the tighter the better. Tape the tube closed with a strip or two of tape. Then make a loosely rolled tube and ask girl to compare it to the tightly rolled tube.

What do they notice? Bend the tightly rolled to create a triangle shape. Make another tightly rolled tube and bend it to create a square or rectangle shape. Have Juniors test both shapes.

**Suggested conversation:** *Which shape seems to be stronger? (Answer: The triangle can withstand more force and is more stable than the square. In general, the more triangles that are used in the structure, the stronger and more stable it will be.)*

*With your team partner, begin your Design Thinking Process by brainstorming how you want to build your paper structure. You can sketch or write your ideas on paper. Your structure should be at least 8-inches tall. Use your rulers.*

Pass out materials for each team. Explain that the piece of cardboard can be used as a platform to support the books.

**Suggested conversation:** *How can you assemble the tubes to make a strong, stable structure? How can you support the structure to keep it from tilting or twisting when you place a heavy book on it? How can you use the cardboard as a platform for the books?*

### Build and Test

Have Juniors build the structure and test it by carefully setting a book on it. Ask girls to observe what happens and redesign and rebuild the structure if necessary. Juniors may ask for help if their structure doesn't work right away. Ask questions to prompt them to find a solution themselves. For example:

If Juniors say: *The tubes tilt or twist.*

You can say: *Find a way to stabilize and support them, like attaching tubes in between them.*

If Juniors say: *A tube buckles when weight is added.*

You can say: *Check if the tube is loosely rolled. If so, re-roll it to make it secure. Also, dents, creases and wrinkles can put stress on some areas and make a material weaker.*

If Juniors say: *The structure collapses.*

You can say: *Make its base as sturdy as possible.*

If Juniors say: *It wobbles.*

You can say: *Remember that triangles are a good way to increase a structure's strength and stability. Turn squares into triangles by adding supports that go from one corner of the square to the other.*

## Share and Reflect

Have Juniors present and demonstrate their paper structures for the group.

**Suggested conversation:** *What made your paper structure especially strong? What problems did you run into--and how did you solve them? How did you have a partner to work with help with the designing and building? Would it have been hard to design and build your paper structure alone? Why?*

## Activity 4: Closing Ceremony: Engineers, Awards & Take Action

### Materials

- None

### Steps

Talk to the Juniors about creating a Take Action project and make a connection to paper and the environment. Tell Juniors about the Journey awards they'll earn. Begin by talking to girls about paper and the environment. It might inspire a Take Action project.

**Suggested conversation:** *When you do a Take Action project, you spot a problem, come up with ways to fix it, make a plan, and team up to take action. What does that sound like? (Answer: The Design Thinking Process.)*

*Around the world nearly 4 billion trees are cut down each year just to make paper! Finding new uses for discarded paper helps conserve one of our most important resources. That's exactly what we did with the paper structure challenge: instead of throwing away old newspaper, it's used to build something new!*

*Where does paper come from? What happens to old newspaper after we're done using it? Why might it be a good idea to build something like this structure out of paper? Why might it be a bad idea? Can you think of other resources or materials that we throw away that could be reused to make something else?*

*One of the things you'll be doing on this Journey is a Take Action project. I will keep a list of any ideas of problems you might want to solve so you can make a team decision and choose one for your project. Did our talk about paper and the environment give you any ideas for a Take Action project?*

*You'll earn two awards on this Journey. The first one is called the "Think Like an Engineer" award. You'll earn that for learning how to solve problems like an engineer.*

*The second one is called the "Take Action" award. You'll earn that for doing a Take Action project that will make a difference in the world.*

## Junior Think Like an Engineer Journey Part 2

*Juniors design an emergency shelter in a hands-on Design Challenge and brainstorm Take Action ideas.*

### Activity 1: As Girls Arrive: Design Like an Engineer

#### Materials

- Paper
- Crayons or colored markers

#### Steps

Welcome Juniors, and ask them to sketch a building that an engineer might design--anything from a tree house to a skyscraper.

**Suggested conversation:** *Today you'll use your engineering design skills to build an emergency shelter. Right now, sketch a building you think an engineer would design. It can be a tree house, a shelter, a skyscraper, a mall, or anything else you think of.*

### Activity 2: Opening Ceremony: Engineers to the Rescue!

#### Materials

- **Design Thinking Process poster**

#### Steps

Talk about how engineers help people. Share the **Design Thinking Process poster**.

**Suggested conversation:** *Engineers use their imaginations to solve problems. They define a need by seeing what problems there are in the world. They brainstorm ideas to design and build something. Then they share their design with others to test and improve it.*

*Every day you see a problem an engineer has solved. For example, engineers design bridges so your car can cross a river. They design planes so you can fly to another place. They design really tall buildings for lots of people to work or live in.*

Have girls share the building designs they sketched from Activity 1 when they arrived.

# Activity 3: Design Challenge: Emergency Shelter

## Materials

- Handout of **Examples of Shelters** (**Note:** Don't show this until after Juniors have designed their shelters.)

For each team of girls of 3-4 girl to build a shelter to fit one person:

- 2-4 cardboard sheets (roughly the size of copy paper)
- 16 five-foot bamboo plant stakes or wooden dowels (these are available at garden centers and hardware stores. If unable to find, look for bendable plastic or aluminum rods or poles.)
- 3-4 large garbage bags, cut open into sheets
- Scissors
- Duct tape
- String
- Paper and pencil

**Note:** Instead of building a life-size emergency shelter, you can have Juniors create a doll-size shelter and adapt materials accordingly. Optional: Bring dolls for girls to fit inside their shelters.

## Steps

**Note:** Give Juniors 10- and 5-minute warnings so they can wrap up in time for the Closing Ceremony.

## Set Up

Set up the Design Challenge.

**Suggested conversation:** *Today you'll design and build an emergency shelter. Your shelter must be sturdy enough to fit at least one person. (Or a doll, if you adapted the activity for a doll-size shelter.) What is an emergency shelter? Who might need one, and why? (Girls may say: Hikers, campers, homeless people, or people who were caught in a natural disaster)*

*There are many reasons people might need temporary shelters. Each year, natural disasters like hurricanes, earthquakes, floods, fires, and tornadoes destroy the homes of millions of people around the world. Engineers and inventors help rebuild lives by inventing and designing temporary housing that can be built quickly, easily, and cheaply, so that people can have a safe place to live. How can you make sure your design conserves energy by keeping heat in when it's cold outside?*

## Brainstorm and Design

Divide Juniors into teams of 3-4 girls to design and build their Emergency Shelter prototype. Remind Juniors that prototyping should be done quickly. That gives them time to test the prototype and, if it doesn't work, redesign (maybe several times).

**Suggested conversation:** *While you sketch and work on your designs, think about these questions:*

- *What features would make for a good shelter?*
- *What would be fairly speedy to build? Remember, this is an emergency!*
- *How will you make a sturdy frame?*



- *How will you connect the poles that make up the frame?*
- *How will you attach the cover to the frame?*
- *How will you get in and out of your shelter?*

## Build and Test

As Juniors start making their prototypes, float around the room and observe. Encourage Juniors to try lots of different solutions to see what works and doesn't work. Remember, the goal is to practice thinking like an engineer, NOT to make a perfect a perfect emergency shelter.

Juniors may ask for help if their structure doesn't work right away. Ask questions to prompt them to find a solution themselves. For example:

*If Juniors say: The frame is collapsing. You can say: Why do you think your frame won't stand up? How can you change the design of your frame? If they need more help, say: Check if the base is too small or isn't well anchored.*

*If Juniors say: The frame tilts or twists. You can say: How could you make the frame stronger? What materials could you try using? Remember that triangles are a good way to increase a structure's strength and stability. If they need more help, say: Try placing a bamboo stake at an angle between two parts of the frame.*

*If Juniors say: The sheeting keeps slipping off. You can say: What can you do to secure the sheeting? What materials could you use? If they need more help, say: Try taping two or three plastic sheets together before draping it over the frame. Try securing it with tape or string.*

## Share and Reflect

Show Juniors the **Examples of Shelters** handout.

**Note:** It's important to show this to Juniors after they've designed so they can use their creativity to come up with new solutions. The activity is not to build a design they've been given, but to come up with their own ideas.

Have each team present their shelter. Start by saying who the shelter was designed for and how it will help them. Have the teams comment on each other's shelters.

**Suggested conversation:** *What do you think is the best feature of this team's design? Why? What design changes would improve this team's shelter? Why would that be an improvement?*

*Do you see a solution in **Examples of Shelters** that you didn't think of? Which one and how would you use it next time? What was it like working in a team? What made it easier? What made it harder?*

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## Activity 4: Closing Ceremony: Brainstorming Our Take Action Project

### Materials

- List of Juniors' Take Action ideas from Think Like an Engineer PT. 1
- **Take Action Guide** handout

### Steps

Have Juniors brainstorm Take Action projects.

**Suggested conversation:** *Last meeting, you talked about how Take Action projects help make the world a better place. Did anyone come up with some new Take Action project ideas?*

Write down Juniors' ideas.

**Note:** Check out the **Take Action Guide** handout in the Meeting Aids if Juniors need help with ideas. Bring the list of ideas Juniors come up with to the next meeting.

## Junior Think Like an Engineer Journey Part 3

*Overview: Juniors do a hands-on Design Challenge, Seismic Challenge, and decide on their Take Action project.*

### Activity 1: As Girls Arrive: Shake it Up

#### Materials

- Music

#### Steps

Play music, and have Juniors do a shake it up dance to get them energized before doing their "Seismic Shake-Up" Design Challenge.

**Suggested conversation:** *In our meeting, you'll be doing a really fun Design Challenge called Seismic Shake-Up. You'll be building a structure that will withstand the energy from an earthquake. Has anyone ever felt an earthquake? Right now, pretend the earth is moving under your feet and do a shake it up dance.*

### Activity 2: Opening Ceremony: Choosing Our Take Action Project

#### Materials

- List of Take Action ideas from last meeting

## Steps

Review Take Action ideas, and have Juniors make a decision.

**Suggested conversation:** *What engineers do is a lot like a Take Action project, isn't it? Can you say why that is? Girls may say: Engineers solve problems, they work together, and they help people.*

*You've already come up with some problems you might like to solve in our last two meetings when we talked about your Take Action project. Let's go over what you've already thought of.*

Give Juniors a chance to make more suggestions.

**Suggested conversation:** *Now you'll decide as a team what you want to do.*

Give Juniors a chance to talk about the ideas they like (or don't like). If Juniors disagree, help them build their conflict-resolution skills. Remind them to speak with respect, listen to other people, and perhaps even develop a new idea together that everyone likes. Instead of stepping in and making the decision for them, help them talk about the pros and cons of each project.

To help Juniors zero in on their top choices, ask open-ended questions, such as:

- *Which of these project ideas sounds like the most fun?*
- *Which projects would help you learn something new?*
- *Which ones will make you feel proud when you're done?*

To help Juniors think about which projects are realistic, ask open-ended questions, such as:

- *Are there any ideas that might be hard to do right now?*
- *It will probably cost a lot of money to do X. As a troop, we have \$X to spend. What do you think we should do? We could put it on a list to do later or we could come up with another idea that doesn't cost so much. What do you think?*

If Juniors are divided between a few ideas, ask them to choose one top idea and keep the others as backups. You can also have girls vote-- just make sure that anyone whose idea wasn't chosen knows that it was a good idea and that it might be used later.

Juniors may reach an agreement quickly. If they don't, note the top 2 or 3 ideas and facilitate an agreement using "fist to five":

- *If you're holding up 5 fingers, you love it!*
- *4 fingers -- it's good.*
- *3 fingers -- you're OK with the idea.*
- *2 fingers -- you're OK with it but perhaps want to make a little change.*
- *1 finger -- you'd like to talk about making more changes.*
- *And a closed fist --no fingers--you really don't like it!*

## Activity 3: Design Challenge: Seismic Shake-Up

### Materials

- **Ring of Fire map**

For each team of 3-4 girls:

- 20-30 wooden or plastic coffee stirrers (5-6 inches)
- ¼ lb. modeling clay, Plasticine preferred
- Manila file folder or 8.5 x 11" piece of thin cardboard
- Ruler to measure height of structure
- Pencils and Paper

**In advance of the meeting**, make one Shake Table for each team of girls. The directions for "How to Build a Shake Table" is a Meeting Aid.

- 2 pieces of sturdy cardboard (about 8 ½ by 11 inches)
- 2 thick rubber bands
- 2 tennis (or rubber) balls)
- 2 large binder clips
- Ruler or paint stirrer to make a handle
- Masking tape

## Steps

**Note:** Give Juniors 10- and 5-minute warnings so they can wrap up in time for the Closing Ceremony.

## Set Up

Set up the Design Challenge activity.

**Suggested conversation:** *Your challenge is to make a structure that can withstand an earthquake's shaking. **Seismic** means something caused by earth's vibrations. It can be caused by nature, like an earthquake, or something artificial, like how the ground vibrates when an airplane takes off.*

*Hundreds of millions of people live in places around the world where earthquakes are common. Most of the destruction that earthquakes cause is the result of collapsing structures, like skyscrapers, hospitals, and bridges. That's why earthquake engineering is so important. By designing buildings and other structures that can withstand the violent shaking of an earthquake, engineers save lives.*

Show Juniors the **Ring of Fire** map.

**Suggested conversation:** *This is called the Ring of Fire. Ninety percent of all earthquakes take place in countries around the rim of the Pacific Ocean. You're going to build structures that can survive an earthquake. How will you know if your building is sturdy and safe? You'll test it, the same way engineers do, by using a shake table.*

Demonstrate how the shake table works.

**Suggested conversation:** *It makes the same back-and-forth motion as an earthquake. Engineers use large shake tables to test out prototypes of the structures they want to build.*

## Brainstorm and Design

Divide Juniors into teams of 3-4 to design and build their Seismic Shake-Up structure. Pass out the building materials. Juniors create structures out of coffee stirrers stable enough to withstand the energy released in earthquakes.

**Suggested conversation:** *How might you use the coffee stirrers and clay to build a structure with a sturdy frame that won't collapse when it's shaken? Brainstorm ideas with your team and sketch them on the file folder.*

To help girls think about the strength of different shapes, say:

- *The shapes used to build a structure help support its weight. Some shapes are stronger than others.*
- *What kinds of shapes (rectangles, triangles, or squares) would be the strongest?*

Remind girls about their Paper Structure activity from Think Like an Engineer PT. 1 where triangle shapes were the strongest.

**Suggested conversation:** *Remember what you learned from your "Paper Structure" activity in our first meeting? The triangle can withstand more force and is more stable than the square. In general, the more triangles you use in your structures, the stronger they will be.*

## Build and Design

Have girls build their designs directly on the file folder. Tell girls their structures must be at least 6 inches tall -- and to use a ruler to measure them. Have girls test their structures using the shake table.

Attach the file folder with the structure on top of the shake table with binder clips. Hold the bottom of the shake table against the surface. Have girls pull the handle and let go. What happens?

**Suggested conversation:** *What does testing help you understand about your structure? What are the strengths of your design? What are the weaknesses? How safe would you feel if you were inside your structure during an earthquake? What could you do to make your structure even better at withstanding an earthquake?*

If girls' structures wobbled, swayed, tipped over or collapsed, it's time to redesign. If the structures held up well on the shake table, challenge them to build an even taller structure! Ask questions to help girls who are having problems. For example, if their structure:

Tips over? Ask: *Why do you think that happened? Remember when we talked about sturdy bases? What could you do to make your base stronger? (Answer: Make it wider.)*

Collapses? Ask: *Why do you think that happened? What shapes did you use? Are there stronger shapes you could try? (Answer: Add triangular shapes. Triangles are stronger than squares or rectangles because all three sides carry some of the load or weight.)*

Wobbles? Ask: *Why do you think that happened? What could you try to make your structure sturdier? (Answer: Try cross-braces. Turn squares into triangles by adding diagonal supports that go from one corner of the square to the other.)*

## Share & Reflect

**Suggested conversation:** *What do you think is the best feature of your design? Why? What were some of the ways you made your structure strong and stable? Why was testing your structure important? If you had more time, what changes would you add to make your structure more stable?*

*The last step in the Design Thinking Process is to share your solutions with others. Why is sharing a solution a good idea?*

## Activity 4: Closing Ceremony: Shake Dance Contest

### Materials

- Music

### Steps

Juniors review their Take Action project and have a Shake Dance Contest.

**Suggested conversation:** *You made a team decision about your Take Action project.*

Review the Take Action project the girls decided on.

**Suggested conversation:** *The next step will be to design your Take Action project, which means you will plan how you'll do your project. And then you will create your project.*

Set up the Shake Dance Contest.

**Suggested conversation:** *When you arrived today, you did a Shake-It-Up dance. Now we'll make a fun contest out of it. When I start the music, everyone will do a shake dance. When the music stops, the dancers freeze. Whoever is still shaking is out. We'll do this until we only have one person left.*

## Junior Think Like an Engineer Journey Part 4

*Overview: Juniors use the Design Thinking Process to design their Take Action project.*

## Activity 1: As Girls Arrive: Junior Jumping Jacks

### Materials

- None

### Steps

Welcome Juniors, and have them do 20 jumping jacks to get energized to start designing their Take Action project.

**Suggested conversation:** *Getting your body moving is one way to boost brainpower because it gets oxygen to your brain and helps improve your thinking. You'll be doing a lot of thinking today as you design your Take Action project! Get your brain in gear with some jumping jacks. Let's start with 20. Go!*

## Activity 2: Opening Ceremony: Designing for a Better World

### Materials

- **Design Thinking Process poster**

### Steps

Have Juniors look at the **Design Thinking Process poster** and connect the steps to the steps they'll be using to design their Take Action project.

**Suggested conversation:** *Today you'll plan the details of your Take Action project. What's the first step of the Design Thinking Process? It's listed on this poster. (Answer: Define a need.) What is the need you've decided you want to solve through your Take Action project? What's the next step? (Answer: brainstorm and design.)*

*Even though you have an idea of what you want to do, you need to brainstorm how you're going to do it. Next week, you'll create what you need to carry out your Take Action plan out. By the end of today's meeting, make sure you have a list of supplies you need.*

## Activity 3: Designing Our Take Action Project

### Materials

- Large pieces of paper or poster boards
- Markers
- Post-It notes
- Pens/pencils

### Steps

**Note:** Stay on schedule so you can hold your Closing Ceremony. Give Juniors 10 and 5-minute warnings before they need to wrap up.

### Brainstorm and Design

Depending on the size of the group, divide Juniors into small design teams of 3-4 to design their Take Action project. Offer things for Juniors to think about, depending on what they want to do. For example:

#### **If Juniors want to make a video, how will they film it?**

- What do they want to say?
- Do they want to wear costumes?
- Do they want to use music?
- How will they show it to people ? at a school assembly, at a gathering of their families, by having an adult post it (safely) online?

#### **If Juniors want to create posters for their school, what materials will they need?**

- Who can they ask for permission to put the posters on the walls?
- How should they ask for permission -- if they want to make a presentation to the principal, what should they say?

- Once they get permission, what should the posters say?
- What will they look like? When do they want to hang up the posters?
- Do they want to get other students to join them?

The ideas are endless! **Keep It Girl-Led** by giving just one or two examples and then seeing where the Juniors take it. Remind them that good teamwork is important. Encourage Juniors to take turns, make sure each girl has a role. Encourage Juniors to write or draw their ideas. Remind them they're designing their Take Action plan. At the next meeting, they will create it.

**Suggested conversation:** *Is there anything you need to make in order to carry out your project? Is there someone you need to ask for help? How could you do that? What would you say?*

You may need to pave the way for Juniors to Take Action by calling school or town officials to get permission for what they want to do. Or set up a time for Juniors to meet the officials to make their Take Action proposal. If possible, guide the conversation so Juniors come up with ideas about how you can help them so they have the experience of connecting with others to Take Action.

Keep a list of the "to do" items Juniors are suggesting, for example: materials they need, people they need to talk to, etc.

## Share and Reflect

**Suggested conversation:** *Does anyone remember what engineers do after they've designed something? (Answer: Share it with others.) Let's take turns telling the group what you designed.*

Give Juniors time to share their ideas.

**Suggested conversation:** *Who else could you share your plan with after this meeting?*

**Girls may say:** family, friends, teachers, neighbors, or classmates. Be sure to listen to what they say-- they may have some ideas to make your plan even better!

## Activity 4: Closing Ceremony: Ready to Take Action!

### Materials

- None

### Steps

Have Juniors share something about their Take Action project design.

**Suggested conversation:** *Let's go around the circle and each shout out one word about how you felt today as you designed your Take Action project.*

Give each Junior a chance to say something.

**Suggested conversation:** *Now let's go around the circle in the other direction. Shout out one word about how you think you'll feel next week when you're taking action and making the world a better place!*

Go over the list of "to dos" that you have for Juniors to create their Take Action project at the next meeting. (This might be a list of materials Juniors need, a reminder to bring props if they're performing a skit, names of people they need to talk to, etc.)



# Junior Think Like an Engineer Journey Part 5

*Overview: Juniors create what's needed to carry out their Take Action project.*

## Activity 1: As Girls Arrive: Power Poster

### Materials

- Poster board
- Colored markers

### Steps

Have Juniors write a word, slogan or phrase on one team poster board that makes them feel powerful.

**Suggested conversation:** *Girl Scouts have slogans like "Be Prepared!" and we say things like "Take Action, Be a Leader, and Make a Difference!" Do you have a word or slogan that makes you feel as if you can do anything? Write it on your team poster board!*

## Activity 2: Opening Ceremony: How Are We Making the World Better?

### Materials

- **Design Thinking Process poster**

### Steps

Have Juniors share why they think their Take Action project will make a difference in the world.

**Suggested conversation:** *Finish this sentence: We're about to team up and Take Action to\_\_\_\_\_.*

Have Juniors say what their Take Action project is about. Have Juniors say one thing she thinks is important about their Take Action project.

**Suggested conversation:** *Each of you take a turn and say one think you think is important about your Take Action project. Complete this sentence: "We're making the world a better place by \_\_\_\_\_"*

## Activity 3: Creating Our Take Action Project

### Materials

- Any materials Juniors need to carry out their Take Action project.

### Steps

**Note:** Stay on schedule so you can hold your Closing Ceremony. Give Juniors 10 and 5-minute warnings before they need to wrap up.

## Set Up

Set up the activity. Break Juniors into teams of 3-4 to create and build their Take Action project.

**Suggested conversation:** *Every Girl Scout Take Action project changes the world a little bit and makes it a better place. You've learned to think like engineers -- to spot problems, work as a team, and come up with a solution. Now you're going to help others by taking action -- and you know that engineers do that, too! In our last meeting, you came up with a plan for your Take Action project.*

Let Juniors list the "to do" items from the last meeting. Remind them of any they missed.

## Build and Test

Help Juniors create what they need (posters, videos, presentations, costumes, and scripts).

If Juniors have a "next step" in their project, remind them about it. For example, they may have written a script and created costumes for a school assembly skit. If so, remind them about when they'll be presenting the skit.

If you've done some "behind the scenes" work since the last meeting, such as setting up a meeting for Juniors with officials or securing permission for their project, let them know about it now.

Congratulate the Juniors if they've completed their Take Action project in this meeting (if, for example, they've created a video that an adult will now share with friends and family or post safely online).

## Activity 4: Closing Ceremony: Plan to Celebrate!

*Juniors brainstorm how they'd like to celebrate the things they learned and do a "Power Word" cheer.*

### Materials

- None

### Steps

Have Juniors plan their celebration.

**Suggested conversation:** *At our next meeting, you'll celebrate everything you learned. How do you want to celebrate?*

Offer prompts for Juniors to come up with their own ideas for the celebration:

- *Do you want to make a special display of our Take Action photos or show our videos?*
- *Do you want special music?*
- *Is there anyone you want to thank?*
- *What do you want to do for the Closing Ceremony?*

Write down their ideas and tell them you'll help organize this for the next meeting. Have Juniors do a "Power Word" cheer.

**Suggested conversation:** *Let's end the meeting by shouting out a power word from the poster you made. First, let's all stand up. When I say GO, everybody jump up at the same time and shout out your favorite power word. Ready? 5-4-3-2-1? Go!*

# Junior Think Like an Engineer Journey Part 6

*Overview: Juniors celebrate what they've learned and receive their Think Like an Engineer and Take Action awards.*

## Activity 1: As Girls Arrive: Get Ready to Celebrate!

### Materials

- Design Thinking Process poster(s)
- Any items Juniors want to display (such as photos or videos from their Take Action project)
- Photos and videos from the Journey meetings
- Music system
- Decorations
- Snacks

### Steps

Have Juniors set up the meeting room by putting up posters and decorations. Make sure they greet guests as they walk in and offer them a snack. When guests have all arrived, have Juniors give a warm welcome to their guests--by saying together: *"Welcome, everyone!"*

## Activity 2: Opening Ceremony: Welcome!

### Materials

- None

### Steps

Have Juniors introduce any special guests.

## Activity 3: Awards Ceremony and Celebration

### Materials

- Think Like an Engineer Award
- Take Action Award

**Note:** You can buy these awards from your council shop or on the GSUSA website.

### Steps

Juniors stand in front of guests and share one thing that they learned while they were on the Think Like an Engineer Journey or while doing their Take Action project. They can make this into a "show and tell" by showing before and after drawings of engineers, photos or video from their Take Action project, or their Design Challenge prototypes. Ask Juniors to stand in front of their audience.

**Suggested conversation:** *Can each of you give an example of something you learned on this Journey?*  
*Junior Think Like an Engineer Journey UNOFFICIAL Rewrite – Page 18*

Give each Junior a chance to speak. If she wants to pass, she can.

**Suggested conversation:** *Please step forward when I say your name to accept your awards.*

Lead a round of applause for each Junior as she steps forward.

**Suggested conversation:** *You have earned your Think Like an Engineer award, which means you learned how to see needs in the world and come up with solutions. And you earned your Take Action award because you did something to make the world a better place. Now you'll start your celebration!*

Include any activities -- such as taking photos, dancing or singing a special song--which Juniors decided to do as part of the celebration.

## Activity 4: Girl Survey

### Materials

- If girls are taking the survey online: Laptop/tablet Link: <http://www.tinyurl.com/STEMgirlENGj>
- If girls are filling out the survey on paper: Copies of **Girl Survey** (see appendix) and pen or pencil

### Steps

Juniors complete the Girl Survey about the Think Like an Engineer Journey.

**Suggested conversation:** *GSUSA wants to know what you think about this program, how you think it could be improved, and what you think of STEM in general. This is a great chance for you to help Girl Scouts create STEM programs that other girls will enjoy! It will take about 10 - 15 minutes.*

Explain to girls how they will be taking the survey -- either online or by filling out a printed version which is located in the Appendix.

**Note:** We hope that all girls will complete the survey--we want every girl's voice to be heard. However, the survey is voluntary, so girls don't have to take the survey if they don't want to. Also, for young girls, we encourage you to read the questions aloud while girls individually complete the survey. Another way is to email the link to parents and ask them to help their daughter fill it out.

## Activity 5: Closing Ceremony: Closing the Circle

### Materials

- None

### Steps

Have Juniors and guests stand in a Friendship Circle. Juniors lead the Closing Ceremony and end with a Friendship Squeeze.

**Suggested conversation:** *Juniors would like to end this Journey together with a Closing Ceremony.*

Have Juniors lead the close of the meeting in the way they chose--for example, a song, poem, or a cheer.

**Suggested conversation:** *And now we'll finish with our Girl Scout tradition, a Friendship Squeeze.*

## Think Like an Engineer Journey

# Materials List

### Think Like an Engineer 1

#### Activity 1: As Girls Arrive: Engineers Create

- Magazines and catalogs that focus on science and technology or ones that include products, such as cars, devices, architecture, gadgets, etc.
- Scissors

#### Activity 2: Opening Ceremony: Jump Into Design Thinking!

- Flag
- **Design Thinking Process** poster
- Optional: Poster Board with the Girl Scout Promise and Law

#### Activity 3: Design Challenge: Paper Structure

- **Design Thinking Process** poster

For each pair of girls:

- Masking or duct tape
- 8 sheets of newspapers
- Four or 5 heavy books
- 1 piece of cardboard (about the size of a piece of copy paper); use it as a platform for the books.
- Twelve-inch ruler to measure height of the structure
- Paper and pencil

### Think Like an Engineer 2

#### Activity 1: As Girls Arrive: Design Like an Engineer

- Paper
- Pens, pencils, markers

#### Activity 2: Opening Ceremony: Engineers to the Rescue!

- Flag
- **Design Thinking Process** poster
- Optional: Poster Board with the Girl Scout Promise and Law

#### Activity 3: Design Challenge: Emergency Shelter

- Handout of **Examples of Shelters** (**Note to Volunteers:** Don't show this to until after Juniors have designed their shelter.)

For each team of girls to create a shelter to fit one person:

- 2-4 cardboard sheets (roughly the size of copy paper)
- 16 five-foot bamboo plant stakes or wooden dowels (these are available at garden centers and hardware stores. If unable to find, look for bendable plastic or aluminum rods or poles.)
- 3-4 large garbage bags, cut open into sheets
- Scissors
- Duct tape
- String
- Paper and pencil

**(Note to Volunteers:** Instead of building a life-size emergency shelter, you can have Juniors create a doll-size shelter and adapt materials accordingly. Optional: Bring dolls for girls to fit inside their shelters.)

## Think Like an Engineer Journey

# Materials List

### Think Like an Engineer 2 (continued)

#### Activity 4: Closing Ceremony: Brainstorming Our Take Action Project

- List of Juniors' Take Action ideas from Think Like an Engineer 1
- **Take Action Guide**

### Think Like an Engineer 3

#### Activity 1: As Girls Arrive: Shake It Up

- Music from a CD player or another system
- For more fun: Play the song, "Shake, Rattle and Roll"

#### Activity 2: Opening Ceremony: Choosing Our Take Action Project

- Flag
- List of Take Action ideas from last meeting
- Optional: Poster Board with the Girl Scout Promise and Law

#### Activity 3: Design Challenge: Pop Fly

- **Ring of Fire map**

For each team of 3-4 girls:

- 20-30 wooden or plastic coffee stirrers (5-6 inches)
- 1/4 lb. modeling clay, Plasticine preferred
- Manila file folder or 8.5 x 11" piece of thin cardboard
- Ruler to measure height of structure
- Pencils and Paper

**Volunteer:** In advance, make one Shake Table for each team of girls. The directions for "How to Build a Shake Table" is a Meeting Aid.

- 2 pieces of sturdy cardboard (about 8 1/2 by 11 inches)
- 2 thick rubber bands
- 2 tennis (or rubber) balls
- 2 large binder clips
- Ruler or paint stirrer to make a handle
- Masking tape

#### Activity 4: Closing Ceremony: Shake Dance Contest

- Music

### Think Like an Engineer 4

#### Activity 2: Opening Ceremony: Designing for a Better World

- Flag
- **Design Thinking Process** poster
- Optional: Poster Board with the Girl Scout Promise and Law

## Think Like an Engineer Journey

# Materials List

### Think Like an Engineer 4 (continued)

#### Activity 3: Designing Our Take Action Project

- Large pieces of paper or poster boards
- Markers
- Post-It notes
- Pens/pencils

### Think Like an Engineer 5

#### Activity 1: As Girls Arrive: Power Poster

- Poster board
- Colored markers

#### Activity 2: Opening Ceremony: Why is Our Project Important?

- Flag
- **Design Thinking Process** poster
- Optional: Poster Board with the Girl Scout Promise and Law

#### Activity 3: Creating Our Take Action Project

- Any materials Juniors need for their Take Action project

### Think Like an Engineer 6

#### Activity 1: As Girls Arrive: Get Ready to Celebrate!

- **Girl Scout Promise and Law** poster(s)
- **Design Thinking Process** poster(s)
- Any items Juniors want to display (such as photos or videos from their Take Action project)
- Photos and videos from the Journey meetings
- Music system
- Decorations
- Snacks

#### Activity 2: Opening Ceremony: Welcome!

- Flag
- Optional: Poster Board with the Girl Scout Promise and Law

#### Activity 3: Awards Ceremony and Celebration

- Think Like an Engineer award
- Take Action award

(**Note to Volunteers:** You can buy these awards from your council shop or on the Girl Scouts' website.)

#### Activity 4: Girl Survey

- If girls are taking the survey online: Laptop/tablet
- If girls are filling out the survey on paper: Copies of Girl Survey (pdf available in Meeting Aids) and pen or pencil



## Think Like an Engineer Journey

### Glossary for Juniors

Juniors may not know some of the words used on this Journey. Here are definitions you can share with them:

**Brainstorming** means coming up with lots of different ways to solve a problem. You can brainstorm with another person or with a team of people.

**Engineers** are people who solve problems. They use their imaginations to invent things like self-driving cars. They also come up with new and better ways to build things, such as bridges, buildings, and planes.

A **prototype** is a quick way to show your idea to others or to try it out. It can be as simple as a drawing or it can be made with everyday materials like cardboard, paper, string, rubber bands, etc.

**Seismic** is something caused by earth's vibrations. It can be caused by nature, like an earthquake, or something artificial, like how the ground vibrates when an airplane takes off.

## Brainstorming Tips: Think, Pair, Share

### How to Run a Think, Pair, Share Activity:

Tell girls that they're going to brainstorm answers to your question using "Think, Pair, Share."

Lead girls through the basic steps by telling them they will:

#### 1. Break into small groups.

#### 2. Listen to the question or prompt.

#### 3. Think about their answers.

- Girls may want to write their answers down.
- Twenty seconds should be enough time, since girls will need to sit quietly.

#### 4. Pair with other girls.

- Girls talk with one to three other girls (depending on group size), making sure everyone has a chance to share their answers. If there's time, it's OK for girls to ask questions about each other's answers.
- For pairs, 20 seconds should be enough time. If your troop enjoys discussion, consider extending this to 1 to 2 minutes.

#### 5. Share with the group.

- Girls share their answers with the larger group.
- This can be completed in 20 – 30 seconds, but will run longer based on group size and how the group sharing is done.

### There are two ways to set up group sharing:

- **Strongly Recommended:** One girl shares the best/most interesting/summary answer for the group. This approach is great if you're running short on time. It also helps develop conflict resolution and compromise skills.
- **Optional:** Each girl shares her partner's answer. This helps girls develop active listening skills, but will run longer because all girls are sharing.

## Think Like an Engineer Journey

# Take Action Guide

## What's the difference between a community service project and a Take Action project?

**Community Service** makes the world better by addressing a problem “right now.” For example, collecting cans of food for a food pantry feeds people “right now.” Gathering toys for a homeless family shelter makes kids happy “right now.” Providing clothing and toiletries to people after a fire or flood helps them “right now.” These acts of kindness are important ways to help people — right now.

**Take Action** encourages girls to develop a project that is sustainable. That means that the problem continues to be addressed, even after the project is over. Sustainability simply means coming up with a solution that lasts.

For example, girls might want to do something about trash in a local park. If they go to the park and pick up trash, they've solved the problem for today — but there will be more trash to pick up tomorrow.

### Instead, girls could explore why there's so much trash. Here's what they might discover:

1. There aren't enough trash cans in the park.
2. The trash cans are hard to find.
3. People have to walk out of their way to throw away trash because of where the cans are placed.
4. People don't realize the importance of putting trash in the trash cans.

### Here's how girls might address these issues:

- **Issues 1 – 3:** Make a presentation to the city council to report on their findings and suggest adding more trash cans or moving them to more visible or convenient positions.
- **Issue 4:** Create a public awareness campaign that encourages people to use the trash cans instead of littering.
- **Variation:** Older girls may want to design interactive garbage cans that make tossing your trash fun. Do an online search for “the fun theory” or “the world's deepest bin” to see this in action.

## What are the steps of a Take Action project?

Girls team up to:

- Identify a problem
- Come up with a sustainable solution
- Develop a team plan
- Put the plan into action
- Reflect on what they learned

**Keep It Girl-Led:** Girls should actively participate in each step in order for this to be girl-led. Younger girls will need more guidance, but they can and should decide as a team what problem they want to address.

## How do girls make their project sustainable?

Here are three ways to create sustainable change:

1. Make your solution permanent.
2. Educate and inspire others to be part of the change.
3. Change a rule, regulation or law.

## How can I help girls come up with Take Action Ideas?

Next are some specific examples you can use to help girls understand what sustainable Take Action projects look like.

**Keep It Girl-Led:** These examples are intended to give a sense of what a Take Action project could look like. **Please do not choose a project from this list for girls to do!** Instead, guide them to brainstorm ideas, get feedback, and come up with a plan. Girls will learn key leadership skills, such as decision-making, compromise, conflict resolution, and teamwork, when their Take Action project is girl-led.

## Engineering/STEM Take Action Ideas

**Issue:** We could conserve water if more people collected rain water and used it to water plants.

- **Solution 1: Make it permanent.** Make rain collection devices for family or friends that can be installed in their yards. Give them a list of different ways to use rain water and how they're helping the Earth.
- **Solution 2: Educate and inspire others.** Create a handout, video tutorial, or show-and-tell presentation about how to make a rain collection device, how to use rain water and how that helps the Earth.

**Issue:** More kids need to know that engineering is a fun, creative way to help others.

- **Solution 1: Educate and inspire others.** For show-and-tell, explain what you've learned about how engineers help others, then lead a design challenge activity with your class.
- **Solution 2: Make it permanent.** Partner with a teacher or principal to create an "engineering space" at school where kids can make prototypes and share ideas for new inventions. Put out a call for donations of recyclable materials or cheap prototyping supplies (cardboard boxes, tape, string, paper towel tubes, etc.) to stock the space.

**Issue:** More people need to know how exciting and fun STEM can be.

- **Solution 1: Educate and inspire others.** Create a list of great books, movies and documentaries that focus on STEM. Make copies for teachers to hand out or make posters for the school library.
- **Solution 2: Educate and inspire others.** Create a short play based on one of the books and perform it for your class or school.

**Issue:** It's hard for new students to meet people and make friends at school.

- **Solution: Make it permanent.** Design and build "buddy benches." Partner with the school to have the benches installed on the playground so kids who want to make new friends can find each other.

## Other Ideas for Take Action

**Issue:** Parents often run their engines outside the school as they wait to pick up or drop off their children, which pollutes the air.

- **Solution: Change a rule, regulation or law.** Make a presentation to the school board or administrators about why this is a problem and suggest a new rule that makes the pick-up/drop-off area a "no idling" zone.

**Issue:** There's no sidewalk along a street near the elementary school, which makes it dangerous for children to walk home.

- **Solution: Make it permanent.** Make a presentation to the city council about the problem and suggest that they build a sidewalk. (Note: Even if the council doesn't vote to create a sidewalk, the girls have earned their Take Action award because they came up with a sustainable solution and took action through their presentation.)
- **Extra Inspiration:** Do an online search for "Girl Scout Brownies Convince City Hall to Build Sidewalk."

**Issue:** There have been several accidents at a busy intersection that doesn't have a stoplight.

- **Solution: Make it permanent.** Research the number of accidents and make a presentation to the city council, asking that they have a stoplight installed.

**Issue:** The local park doesn't have a swing for children with disabilities.

- **Solution: Make it permanent.** Make a presentation to the city council explaining the problem and offering to use troop money from the cookie sale to help pay for the swing.
- **Extra Inspiration:** Do an online search for "How One Brownie Troop Became Social Entrepreneurs.")

**Issue:** We should recognize women who have helped their communities and made the world a better place in all kinds of ways.

- **Solution: Educate and inspire others.** Research the "hidden figures" in your community (unsung women who've done great things). Create a display about their accomplishments for a library or community center.

**Issue:** The local shelter is having a hard time getting rescue animals adopted.

- **Solution: Educate and inspire others.** Use your photography skills to create pet portraits for the shelter's web site. Use your writing skills to craft heart-warming bios for each portrait.

## Need more ideas?

Check out [Girls Changing the World](#) on the GSUSA web site. Girls post their Take Action and Bronze/Silver/Gold Award projects on this site. You can search by project topic or grade level. (And after the troop has done their project, please post it so they can inspire other girls!)



## 33 Ways to Take Action!

### Make your solution permanent.

1. Make and install something outside (benches, bird houses, dog run, ropes course, sensory trail for children with disabilities, Little Library, etc.)
2. Plant something (butterfly garden, tree, wind chime garden, etc.)
3. Make something inside (Maker Space, reading room, etc.)
4. Create a collection (children's books children's hospital or family shelter, oral histories for town museum, etc.)
5. Advocate for building a permanent community improvement (sidewalk, bridge, park, streetlights, stoplight, etc.)

### Educate and inspire others to be part of the change.

6. Do a show-and-tell
7. Create a poster campaign
8. Perform a skit
9. Make a "how to" handout
10. Draw a comic
11. Give a speech
12. Write and perform a song
13. Make an animated movie
14. Make a live-action movie
15. Make a presentation
16. Create a workshop (perhaps in partnership with a local business or organization) to teach a skill such as coding, camping, canoeing, robotics, sewing, car care, healthy eating, gardening, home repair, budgeting, etc.
17. Create a workshop to teach others about healthy living (exercise, nutrition, mental health, etc.)
18. Create a social media campaign
19. Make video tutorials to teach a skill
20. Organize an email campaign
21. Organize a petition
22. Organize an event (concert, play, poetry slam, art exhibit, sporting event, field day) to raise awareness about an issue
23. Make a "playbook" to help others follow your lead (how to mentor robotics teams, organize a workshop or event, advocate to city council, create an online petition, change a law, etc.)
24. Make an app that helps people take action on an issue
25. Create a web site
26. Write an op-ed or letter to the editor of a newspaper or magazine
27. Start a blog

### Change a rule, regulation or law.

28. Make a presentation to your school principal
29. Make a presentation to your school board
30. Make a presentation to your city council
31. Speak up at your representative's town hall meeting
32. Create an online petition
33. Advocate for a law with your state government



# THE DESIGN PROCESS

Used by engineers, inventors, and other problem solvers, the design process is a series of steps that help people think creatively and come up with solutions.



DEFINE THE NEED



BRAINSTORM



DESIGN



BUILD



REDESIGN



TEST & EVALUATE



SHARE SOLUTIONS



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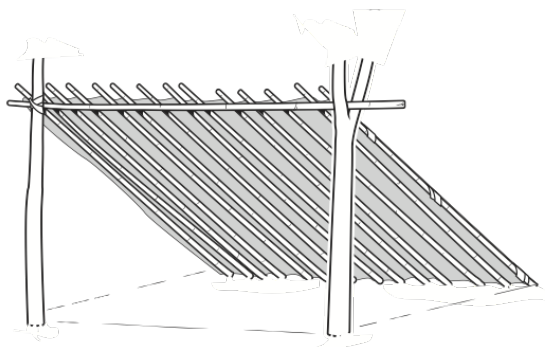
The DESIGN SQUAD GLOBAL material is based on work supported by the National Science Foundation under Grant No. DRL-1422236. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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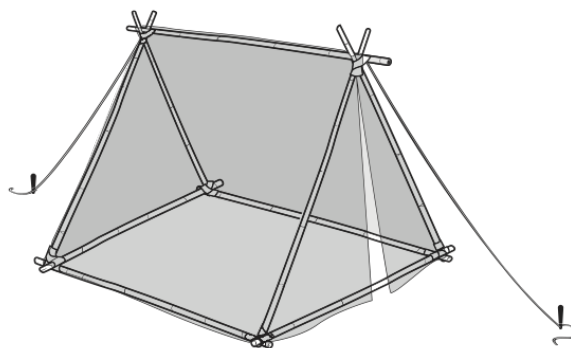
## Think Like an Engineer Journey



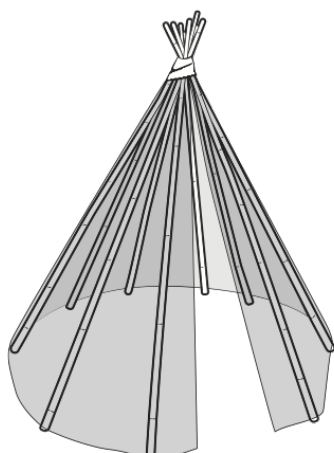
## Examples of Shelters



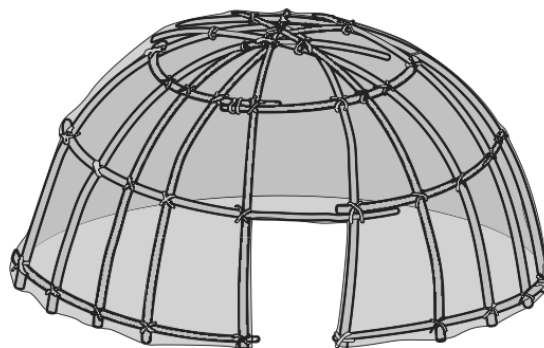
**Lean-To Shelter Tent**



**A-Frame Tent**



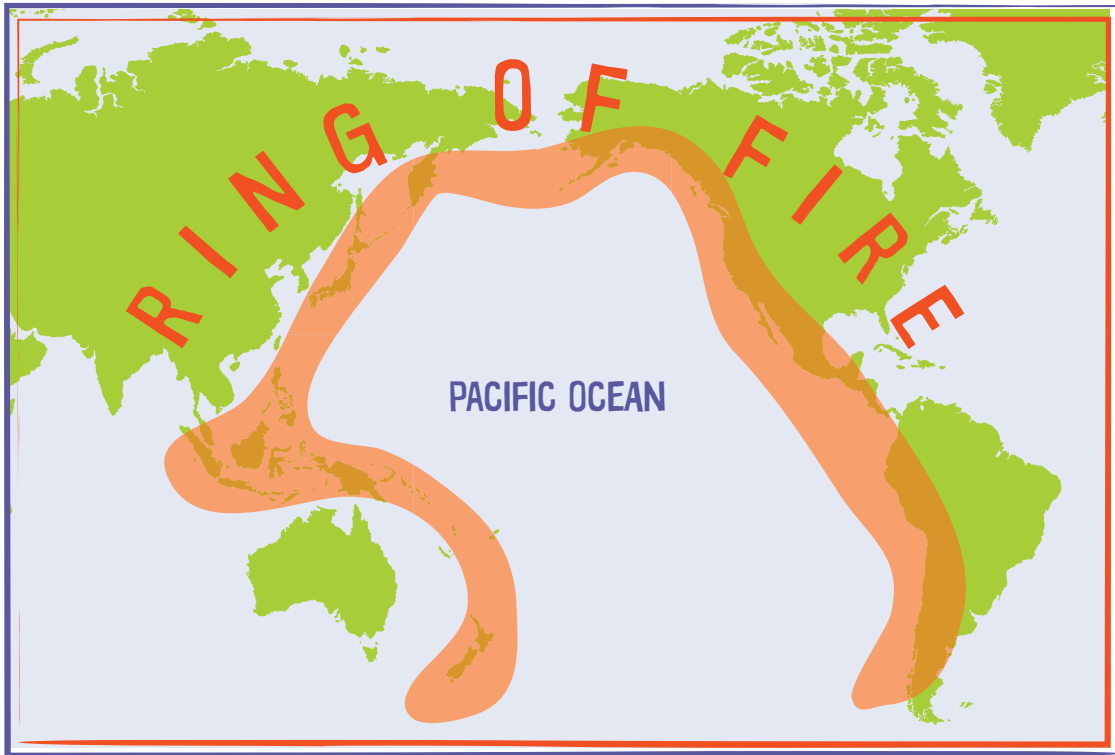
**Cone-Shaped Tent (Tipi)**



**Dome-Shaped Tent**

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# RING OF FIRE



About 90% of all earthquakes take place along the Ring of Fire—a zone stretching around the rim of the Pacific Ocean.



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## Think Like an Engineer Journey

# How to Build a Shake Table

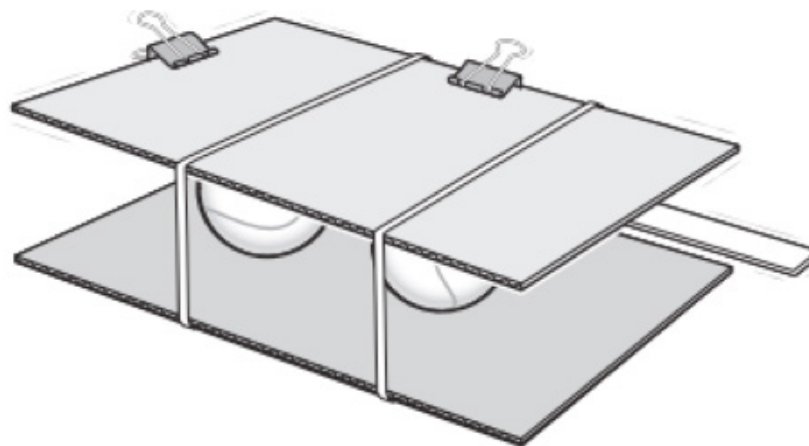
**Volunteer:** In advance, make one Shake Table for each team of girls. A Shake Table is a device engineers use to stimulate the back-and-forth shaking of an earthquake.

### Materials for one Shake Table:

- 2 pieces of sturdy cardboard (about 8 1/2 by 11 inches)
- 2 thick rubber bands
- 2 tennis (or rubber) balls
- 2 large binder clips
- Ruler or paint stirrer to make a handle
- Masking tape

### Steps:

1. Wrap the rubber bands around the width of both pieces of cardboard. Space them about 4 inches apart.
2. Slide the two tennis balls in between the pieces of cardboard, and position them underneath each rubber band.
3. Tape the ruler (or paint stirrer) under the top piece of cardboard to make a handle.



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## K-5 Think Like an Engineer Journey – Junior Survey

### Congratulations on Completing the *Think Like an Engineer* Journey!!

We'd love to know what you think about it. Please take a few minutes to tell us about your experience with this program. The survey should take 5-10 minutes to complete. Your answers are private and will be used to improve Girl Scout program.

Here are a couple of things to know before you get started:

- **STEM stands for Science, Technology, Engineering and Math.**
- **If you do not want to take the survey, you do not have to.** However, we hope you will so we can learn more about you and what you think about STEM.
- **Please read each question carefully and mark the answer that is most like you.** If you don't understand a question, please ask an adult for help.
- **This is not a test.** There are no right or wrong answers. We want to know what you really think and feel. So, please answer honestly.

1. How much did you like the program you just finished?

- A lot                     
  A little                     
  Not very much                     
  Not at all

2. This program was...

- Way too easy                     
  A little too easy                     
  Just right                     
  A little too hard                     
  Way too hard

3. Would you recommend this program to your friends?

- Definitely                     
  Probably                     
  Probably not                     
  Definitely not

4. Would you like to do more STEM activities through Girl Scouts?

- Yes                     
  Maybe                     
  No

5. How true are these statements to you?

	Very true	Kind of true	Not very true	Not true at all
This program makes me want to do more STEM program with Girl Scouts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I hope that my troop does more STEM programs soon.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I did an activity in this program that I've never done before.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I learned something new about science, engineering or technology in this program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. What did you like the most about the program?

7. What could Girl Scouts change about the program to make it better?

8. Describe one thing you learned in this program that you didn't know before.



**For the following questions, tell us how much each statement is LIKE YOU!**

If the statement describes you very well, circle “Exactly”. If the statement does not describe you very well, circle “Not at all”. If you don’t know how to answer, that’s okay. You can circle, “I don’t know”.

<i>How much is this like you?</i>	Exactly	A lot	Kind of	A little	Not at all	I don’t know
I like to figure out how things work.						
I love building things.						
I am excited to learn more about science.						

<i>How much is this like you?</i>	Exactly	A lot	Kind of	A little	Not at all	I don’t know
I can do most science projects I try.						
I am very good at solving problems.						
I am very good at coming up with new ideas when working on projects.						

<i>How much do you agree with each statement?</i>	Exactly	A lot	Kind of	A little	Not at all	I don’t know
Thinking like a scientist will help me do well in my classes.						
Engineers make the world a better place to live.						
Knowing science and technology is important for being a good citizen.						

<i>How much is this like you? When trying to solve a problem...</i>	Exactly	A lot	Kind of	A little	Not at all	I don’t know
I first try to understand what caused it.						
I think about different ways to solve it.						
I gather or consider information from different places.						
I think carefully about the information I have obtained.						
I try different ways to solve it when I get stuck.						

**9. Which of these is like you?**

- I usually don’t like doing STEM activities.
- I kind of like doing STEM activities.
- I love doing STEM activities.

**10. What Girl Scout level are you?**

- Daisy
- Brownie
- Junior
- Cadette
- Senior
- Ambassador

**11. How many years have you been a Girl Scouts (not including this year)?**

- None, this is my first year
- 1 year
- 2 years
- 3 years
- 4 years
- More than 4 years

*THANK YOU for completing this survey! 😊*