Think Like an Engineer pt. 3

Overview

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

Note to 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 (with photo releases if at all possible!).

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

Prepare Ahead

- Gather supplies.
- If your meeting location doesn't have a flag, bring a small one that Juniors can take turns holding or hang in the room.
- Print copies of the **Design Thinking Process poster.**
- Read and print out **How to Build a Shake Table/How to Use a Shake Table**
- Make shake tables (one for every five girls). A shake table is a device engineers use to simulate the back-and-forth shaking of an earthquake.
- Read the following handouts (found in the **Meeting Aids** section):

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.

Get Help from Your Family and Friends Network

Your Friends and Family Network can include:

- Juniors' parents, aunts, uncles, older siblings, cousins, and friends
- Other volunteers who have offered to help with the meeting.

Ask your Network to help:

- Bring art supplies.
- Bring a camera, smart phone, or video camera to document the meetings.
- Assist with Design Challenge activities.

Award Connection

Juniors will earn two awards:

- Think Like an Engineer award
- Take Action award

They receive both awards in **Think Like an Engineer PT. 6.**

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

Meeting Length

90 minutes

- The times given for each activity will be different depending on how many Juniors are in your troop.
- There is no snack time scheduled in these meetings, but there are 15 minutes of "wiggle room" built in for snacks or activities that run long.

- Give Juniors 10- and 5-minute warnings before they need to wrap up the last activity so you'll have time for the Closing Ceremony.

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

Materials List

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: Seismic Shake-Up

- **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

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 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

Activity 4: Closing Ceremony: Shake Dance Contest

- Music

Awards
Juniors do not receive any awards in this meeting.

Detailed Activity Plan

Activity 1: As Girls Arrive: Shake it Up

Time Allotment
10 minutes

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.

SAY:
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

Time Allotment
20 minutes

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

Steps
Recite the Pledge of Allegiance and the Promise and Law

Conduct any troop business.

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

SAY:
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.

SAY:
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

Time Allotment
35 minutes

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

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

Set Up. (5 minutes)
Set up the Design Challenge activity.

SAY:
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**.

SAY:
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.

SAY:
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. (10 minutes)
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.

SAY:
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.

SAY:
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. (15 minutes)
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?

SAY:

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. (5 minutes)

SAY:
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

Time Allotment
10 minutes

Materials
- Music

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

SAY:
You made a team decision about your Take Action project.

Review the Take Action project the girls decided on.

SAY:
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.

SAY:
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.

End the meeting with a Friendship Squeeze.

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.

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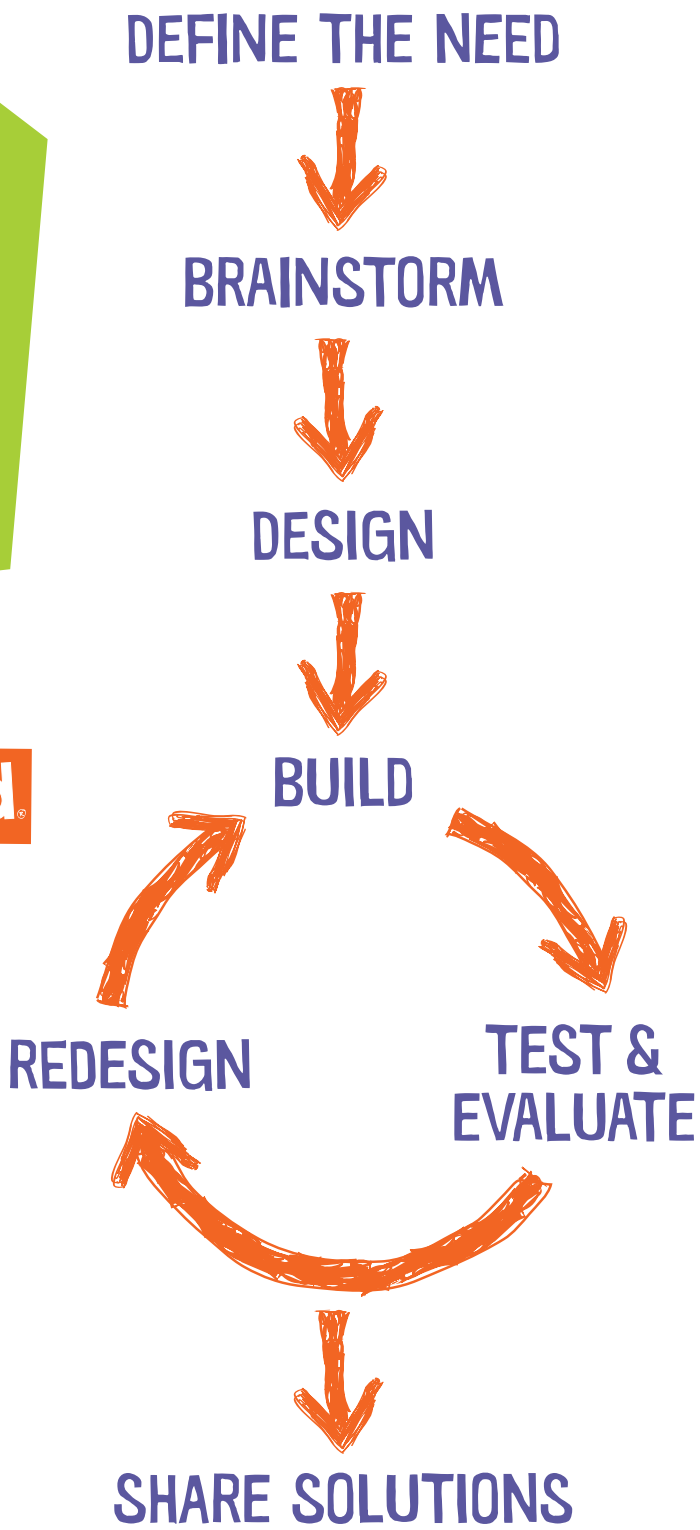

DESIGN SQUAD GLOBAL is produced by WGBH Boston

MAJOR FUNDING NSF PROJECT FUNDING The Lemelson Foundation

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Major Funding is provided by the National Science Foundation. Project funding is provided by The Lemelson Foundation.

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.

girl scouts

The Girl Scout Promise

On my honor, I will try:

To serve God and my country,

To help people at all times,

And to live by the Girl Scout Law.

The Girl Scout Law

I will do my best to be

honest and fair,

friendly and helpful,

considerate and caring,

courageous and strong, and

responsible for what I say and do,

and to

respect myself and others,

respect authority,

use resources wisely,

make the world a better place, and

be a sister to every Girl Scout.

Think Like an Engineer Journey

How to Build a Shake Table

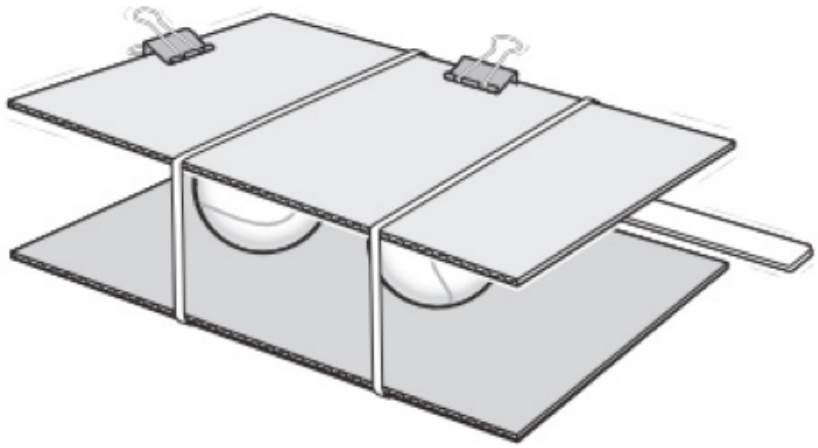
Volunteer: In advance, make one Shake Table for each team of girls. A Shake Table is a device engineers use to stimulate the back-and-forth shaking of an earthquake.

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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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

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.

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

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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

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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

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.

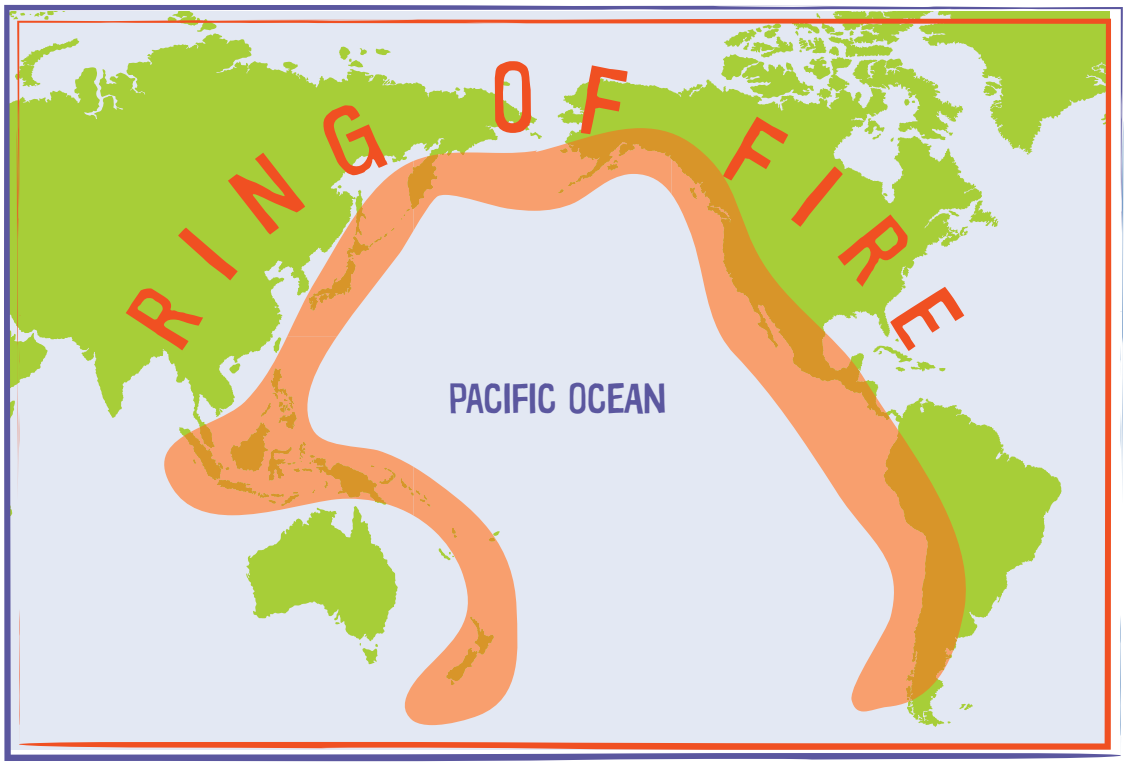
5. **Share with the group.**
   - Girls share their answers with the larger group.
   - This can be completed in 20 – 30 seconds, but will run longer based on group size and how the group sharing is done.

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.

DESIGN squad Global HANDOUT

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.

PBS KIDS
WGBH DESIGN SQUAD GLOBAL is produced by WGBH Boston
MAJOR FUNDING NSF
PROJECT FUNDING The Lemelson Foundation Improving lives through invention

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.

Major funding is provided by the National Science Foundation. Project funding is provided by The Lemelson Foundation.