

Think Like an Engineer pt. 1

Overview

Girls learn how engineers use the Design Thinking Process to solve problems and do a hands-on Design Challenge activity. Then, girls connect the steps of the Design Thinking Process to the steps of a 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 girls 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 girls know they can make choices and have their voices heard.

Fail Fast. Succeed Sooner: That's how engineers solve problems. On this Journey, girls 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 girls think this way. When a girl'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 girls are free to invent things without feeling the pressure to make them perfect.

Leave Time For The Closing Ceremony: If girls 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 girls leave a meeting, they'll remember how much fun it was to build something

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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 girls 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 girls 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 girls' 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 girls will remember their whole lives. Try to capture those memories with photos or videos. Girls love remembering all they did — and it's a great way for parents to see how Girl Scouting helps their girls.

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

Prepare Ahead

- Gather supplies.
- If your meeting location doesn't have a flag, bring a small one that girls can take turns holding or hang in the room.
- Print copies of the **Design Thinking Process poster**.
- Prepare the surprise bags for the "Helping Hand" activity. Fill paper or plastic bags with small, lightweight items (puzzle pieces, balls, stickers, popcorn, etc.). Use masking tape to fasten the surprise bags to a wall, ceiling, or other high spot a few feet above girls' heads where it won't be too hard to remove the bag with the hand grabbers they build.
- Prepare stirrers for the "Helping Hand" activity (if using wood). Because drilling through wood is tricky and takes time, do this ahead of time. Using a pair of scissors (or Phillips head screwdriver), make small holes in the wooden paint

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stirrers or slats. Turn and twist one blade of a sharp scissors in one spot until it goes through the other side.

1. In half the stirrers, make one hole in the middle.
 2. In the other half, make two holes, each about 2-inches from the ends of the stirrer.
 3. As girls work on the activity, you may need to help them make more holes.
- Read the following handouts (found in the **Meeting Aids** section):

Multi-Level 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.

Multi-Level Think Like an Engineer Journey Glossary: This is a list of words that girls may not know and how to define them.

Think, Pair, Share: These facilitation tips will help you to 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.

Benefits of a Multi-Level Troop: This handout highlights the benefits of running a multi-level troop and offers practical advice and insight into working with multi-level girls.

- *Optional:* Decorate the meeting room with pictures of female engineers and pictures of bridges, dams, roller coasters, skyscrapers, airplanes, skateboards, self-driving cars, robots, smart phones, and anything else designed by engineers.

Get Help from Your Family and Friends Network

Your Friends and Family Network can include:

- Girls' 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.

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Award Connection

Girls 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 girls are in your troop.
- There is no snack time scheduled in these meetings, but there are 15 minutes of “wobble room” built in for snacks or activities that run long.
- Give girls 10- and 5-minute warnings before they need to wrap up the last activity so you'll have time for the Closing Ceremony.

Girls learn how engineers use the Design Thinking Process to solve problems and do a hands-on Design Challenge activity. Then, girls connect the steps of the Design Thinking Process to the steps of a Take Action project.

Materials List

Activity 1: As Girls Arrive: What Is an Engineer?

- Paper
- Crayons, colored markers

Activity 2: Opening Ceremony: All About Helping

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

Activity 3: Design Challenge: Helping Hands

- Examples of levers to show girls: scissors, tongs, pliers, tweezers

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For each team of girls:

- Small paper or plastic bags filled with lightweight items attached high on a wall or ceiling
- 4 - 6 paint stirrers or thin slats of wood. Alternate: thin slats of wood or strips of cardboard taped together
- 4 - 6 brass fasteners or short pieces of wire
- Tape (duct or masking)
- Small pieces of sturdy cardboard (any size)
- Scissors
- Rubber/elastic bands
- String
- Paper or plastic cups
- Toothpicks
- Wooden skewers
- Paper and pencil

Activity 4: Closing Ceremony: Making the World a Better Place

- None

Awards

Girls do not receive any awards in this meeting.

Detailed Activity Plan

Activity 1: As Girls Arrive: What Is an Engineer?

Time Allotment

10 minutes

Materials

- Paper
- Crayons or colored markers

Steps

Welcome girls, and ask them to draw a picture of an engineer.

SAY:

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You're about to learn what engineers do and how they solve problems.

Draw a picture of what you think an engineer looks like.

Make sure every girl in the troop gets a chance to draw a picture.

Save the pictures. Girls will repeat this activity in Think Like an Engineer PT. 5. It will be fun for them to compare how their mental picture of engineers has changed and it will be a fast, visual way for you to see the progress they've made.

Activity 2: Opening Ceremony: All About Helping

Time Allotment

20 minutes

Materials

- Flag
- **Design Thinking Process poster**
- 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.

Explain the Design Thinking Process as the way engineers solve problems.

SAY:

On this Journey, you're going to learn how engineers help people.

Who knows what engineers do?

Girls may say: Drive trains, build things, invent things, etc.

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.

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

SAY:

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: Helping Hands

Time Allotment

35 minutes

Materials

- Examples of levers to show girls: scissors, tongs, pliers, tweezers

For each team of girls:

- Small paper or plastic bags filled with lightweight items attached high on a wall or ceiling
- 4 - 6 paint stirrers or thin slats of wood. Alternate: thin slats of wood or strips of cardboard taped together
- 4 - 6 brass fasteners or short pieces of wire
- Tape (duct or masking)
- Small pieces of sturdy cardboard (any size)
- Scissors
- Rubber/elastic bands
- String
- Paper or plastic cups
- Toothpicks
- Wooden skewers
- Paper and pencil

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Steps

(Note to Volunteers: Give girls 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. Pair two different level girls into teams to design and build their Helping Hand prototype.

SAY:

The first step is to “define a need.” That means to find a problem and then figure out how to fix it.

Let’s say your grandmother is having a hard time walking up the stairs. Can you think of something you could design that would help her? Like what?

Girls may say: I’d build a ramp, make a special cane, or design a motor chair that will lift her up the stairs.

*When you see someone with a problem and want to help, you are showing **empathy**.*

Empathy means trying to understand what it feels like to be another person. You use your imagination to try to understand what their life is like and what makes them happy or sad or frustrated or joyful.

Have you ever been frustrated because you couldn’t get something that was out of your reach? What were you trying to reach? How did it feel when you couldn’t grab it?

Your challenge is to design a device that will help you to grab a bag that hangs higher than you can reach.

Point to the surprise bags you’ve attached to the ceiling or the wall.

SAY:

You and your team partner will be designing what’s called an “assistive device.” Assist means help, so an assistive device helps you do something you couldn’t otherwise do easily.

Engineers have created some amazing assistive devices like wheelchairs, walkers, and prosthetic arms and legs.

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They help make life better for people who are sick, injured, disabled, or elderly.

Brainstorm and Design (10 minutes)

SAY:

To grab something, a device needs two parts—or arms—that can go on each side of the item being grabbed.

The grabber also needs to have a way to press the two arms together to make a pinching motion.

Show girls the examples of different levers you brought to the meeting.

SAY:

How do you think levers might make our lives easier?

Girls may say: Tongs make it easier for people to pick up and hold hot food. It's easier to cut paper with scissors than a tool like a knife.

Show girls the materials.

SAY:

One good way to start is by making a lever that can open and close. You can do that by connecting two paint stirrers with a brass fastener.

You can use the cups, rubber bands, string, skewers, toothpicks, and other materials to make something at the end of the grabber that can pinch or grip an object.

Here are some things to think about:

How can you make a grabber that opens and closes so it can grip the bag?

How can you make your grabber long enough to reach the bag?

How can you control the grabbing motion when it's at the end of the long stick?

Have girls brainstorm ideas and sketch the ones they want to build on paper.

Multi-Level Tip: Encourage older girls to work with a younger partner as a team to come up with solutions together. Praise them when you hear them collaborating. Let

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them know that engineers work in teams and need to get along with people of all different experiences and backgrounds.

You can also ask an assistant or parent to help the Daisies while the Brownies and Juniors work together.

Either option works! The first option gives older girls a chance to teach younger girls and practice leadership skills, in addition to learning about engineering. The second option gives Daisies more specialized attention and allows the older girls to team up and learn at roughly the same level.

Build and Test. (15 minutes)

Get girls 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 device!

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

If girls say: The arms open but don't close...or close but don't open.

You can say: *Look at your supplies. What could you use to help the device open or close?* (Give girls time to come up with ideas. If they need some help, use this prompt: *How could you use rubber bands? Strings? Skewers?*)

If girls say: It keeps dropping things.

You can say: *How can you make a stronger grip?* (Give girls time to come up with ideas. If they need some help, use this prompt: *How could you make "hands" using your paper cups? What materials could you use?*)

If girls say: The arms keep bending or twisting.

You can say: *How could you make them stronger?* (Give girls time to come up with ideas. If they need some help, use this prompt: *What materials could you use to reinforce the arms and make them stronger? Duct tape? Extra pieces of cardboard?*)

Share and Reflect. (5 minutes)

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Have girls present their designs and demonstrate how they function.

SAY:

What's the best feature of your design? Explain how it works.

*What are some ways you tested your design to see how it worked?
What did you learn from testing?*

Can you think of situations where having a Helping Hand would be helpful?

Who could use a Helping Hand device? Why would they need it?

What was it like to work as a team? Were your ideas heard? Did you agree on the same thing?

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Activity 4: Closing Ceremony: Making the World a Better Place

Time Allotment

10 minutes

Materials

- None

Steps

Have girls form a Friendship Circle. Go over the steps of doing a Take Action project and how similar it is to the Design Thinking Process. Tell girls about the Journey awards they'll earn.

SAY:

There's a special way that Girl Scouts help others. Does anyone know what it is?

Girl Scouts do Take Action projects to help make the world a better place.

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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.)

At each meeting, you'll come up with problems you'd like to solve, like you did today. I'll keep a list of your ideas, so you can choose one 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.

End the meeting with a Friendship Squeeze.

Benefits of a Multi-Level Troop

Leading a multi-level troop can be lots of fun, but also challenging!

Picture this: The troop meeting is in full swing. You notice that the Brownies and Juniors are absorbed in an activity, but the Daisies are distracted. Or the Juniors are ready to take on a more complex project, but the younger girls can't move at the same pace or don't get the concept. Or you see that the Daisies are having tons of fun doing an activity that completely bores the Brownies and Juniors.

How do you manage it all?

This Think Like an Engineer Journey was developed with the multi-level troop in mind. You'll find "multi-level notes" throughout to help you navigate the challenges of leading groups of K – 5 girls .

Multi-level troops are naturally set up to create a more girl-led environment.

- Older girls have a unique opportunity to lead. They can serve as role models for younger girls, creating an enhanced leadership experience for all involved. They can explain more advanced concepts, which gives younger girls a powerful near-peer experience.
- Younger girls have aspiration built right into their experience. As they interact with the older girls, they learn what's possible for them.

Multi-level troops offer all girls a diversity of perspective.

When they do an activity together:

- Older girls approach it with confidence and skill, based on their experience.
- Younger girls bring a sense of wonder and imagination that makes the

Tips for Working with Girls at Different Levels

Follow these tips and insights to help make your multi-level troop experience fun, not challenging:

- Check out the STEM Glossary in Meeting Aids, and share definitions with all girls.
- Offer younger girls more concrete guidance to help them express their thoughts and come up with ideas.
- Older girls will have more nuanced understandings of interpersonal interactions and how Girl Scouts can take action, as well as more in-depth knowledge about the subject matter. They will bring up more complex concepts, which won't be familiar to younger girls. This is a great opportunity to ask older girls to share their knowledge with younger girls. Ask questions like, "Can you give us an example of that?" or "Can you describe that for everyone in the group?"
- Sometimes Daisies will outperform Brownies or you may have Juniors who perform at Brownie level. That's all OK, just customize your activities based on your experience with your troop.
- Younger girls will need more adult supervision, and it's natural that older girls will help them, too. But make sure to treat older girls like troop members, not as mini-Troop Leaders.
- Help older girls feel welcomed and valued by giving them leadership opportunities, such as guiding a discussion or acting as a scribe. Juniors may want to earn their Junior Aide award by mentoring the younger girls.
- Give older girls more responsibility in troop decision-making. While all girls should be involved in decision-making at some level, older girls will be able to offer good insights about how to make things work better for them. When older girls make a suggestion that can reasonably be implemented, try it out and acknowledge their contribution.
- Encourage all girls to help hand out supplies and snacks.

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 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: 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 Girls

Girls 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.

Confidence means believing in who you are. It means you know that what you say and do can affect others—for the better!

Empathy means trying to understand what it feels like to be another person. You use your imagination to try to understand what their life is like and what makes them happy or sad or frustrated or joyful.

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.

Think Like an Engineer Journey: Materials List

Think Like an Engineer 1

Activity 1: As Girls Arrive: What Is an Engineer?

- Paper
- Crayons, colored markers

Activity 2: Opening Ceremony: All About Helping

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

Activity 3: Design Challenge: Helping Hand

- Examples of levers to show the girls: scissors, tongs, pliers, tweezers

For each team of girls:

- Small paper or plastic bags filled with lightweight items attached high on a wall or ceiling
- 4 - 6 paint stirrers or thin slats of wood. Alternate: thin slats of wood or strips of cardboard taped together
- 4 - 6 brass fasteners or short pieces of wire
- Tape (duct or masking)
- Small pieces of sturdy cardboard (any size)
- Scissors
- Rubber/elastic bands
- String
- Paper or plastic cups
- Toothpicks
- Wooden skewers
- Paper and pencil

Think Like an Engineer 2

Activity 1: As Girls Arrive: Our Favorite Water Places

- Paper
- Colored markers

Activity 2: Opening Ceremony: How Much Water Do We Use?

- Flag
- Gallon jug of water (it can also be empty)
- **Design Thinking Process** poster
- Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Design Challenge: Water Collection Device

- Toilet paper/paper towel rolls
- Empty cans or jars
- Construction paper or poster board
- Markers or pens/pencils
- Glue
- Scissors
- String
- Rubber bands

Think Like an Engineer Journey: Materials List

Think Like an Engineer 3

Activity 1: As Girls Arrive: Get Ready for Pop Fly

- Paper cups (to be used in Pop Fly activity)
- Crayons or colored markers
- Stickers and other decorative items

Activity 2: Opening Ceremony: Reviewing Our Take Action Ideas

- Flag
- Index Cards (or a whiteboard and marker)
- Pens
- Tape
- Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Design Challenge: Pop Fly

For each pair of girls:

- Masking or duct tape
- 3 – 5 paint stirrers, wooden slats, balsa wood (used for models) or several pieces of thick cardboard taped together
- 1 small, lightweight ball (ping pong ball, foam ball, etc.)
- 1 wooden block or spool (or an empty plastic bottle)
- 1 small paper cup
- Target: Use masking/duct tape to make a large square on a wall or prop up an empty cardboard box.
- Paper and pencil

Activity 4: Closing Ceremony: Time to Decide on Take Action!

- List of Take Action ideas from last meeting

Think Like an Engineer 4

Activity 1: As Girls Arrive: Girl Power!

- Blank name tags – enough so that each girl can have several
- Crayons and markers
- Stickers

Activity 2: Opening Ceremony: Girl Scouts Around the World

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

Activity 3: Designing Our Take Action Project

- Large pieces of paper or poster boards
- Markers
- Post-It notes
- Pens/pencils
- **Design Thinking Process** poster

Think Like an Engineer Journey: Materials List

Think Like an Engineer 5

Activity 1: As Girls Arrive: What Is an Engineer, Part 2

- Girls' engineer drawings from Think Like an Engineer 1
- Paper
- Crayons or 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 girls 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 girls 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.