

Think Like an Engineer pt. 6

Overview

Girls celebrate what they've learned and receive their Think Like an Engineer and Take Action awards.

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!).

Girl Input: GSUSA wants to know what girls think about this program. We also want to find out how well the program worked in terms of increasing girls' interest, confidence, and competence in STEM. This information will help us to improve our program and talk about the program's impact. Please encourage your girls to take this survey so that their voices are heard. There are three ways you can help girls do this:

- **Option 1 – Girls Take The Survey At The Last Meeting:** You will need technology (ie, tablets, laptops, wi-fi) to use this option. Set aside 10-15 minutes for girls to complete the survey. Use this link: <http://www.tinyurl.com/STEMgirlENGm>
- **Option 2 - Send Survey Link To Parents:** Email parents and ask them to have their girls complete the girl survey. Here is some suggested text for your email to parents:

Dear Parent –

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GSUSA wants to know what girls think about this program. We also want to find out how well the program worked in terms of increasing girls' interest, confidence, and competence in STEM. This information will help us to improve our program and talk about the program's impact.

Please encourage your girl(s) to take our survey by clicking on the following link: <http://www.tinyurl.com/STEMgirlENGm>. It should only take 10-15 minutes. Depending on your girl's age, you may need to help her understand the questions. However, please do not help her select her answers – we want the responses to come from her.

If you have any questions, please email the Girl Scout Research Institute at gsresearch@girlscouts.org.

Sincerely –

- **Option 3 – Print The Survey, Have Girls Complete It, & Send The Surveys To GSUSA:** If you are unable to have girls complete the survey at the last meeting and unable to send parents the link to the survey for girls to complete, please print copies of the Girl Survey. You'll find the survey in the Meeting Aids section of this meeting.
1. Have each girl complete her own survey.
 2. Either scan the surveys and email them to: GSresearch@girlscouts.org.
- OR**
3. Mail the surveys to:
Girl Scout Research Institute
GSUSA
420 Fifth Avenue
16th floor
New York, NY 10018

Prepare Ahead

- Bring decorations and snacks.
- Bring a music system.
- Collect all the materials the girls created from the Journey, photos of their Take Action projects, and photos and videos you've taken along the way.

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- Invite any special guests (such as people in the community who have helped the girls with their Take Action project).
- Send reminders to the girls' families.
- From your council shop or the Girl Scout website, buy the Think Like an Engineer and Take Action awards, one for each girl.
- If your meeting location doesn't have a flag, bring a small one from home to either hang or have girls take turns holding.
- Choose how girls will give feedback on the Journey. Look at the three options available for girls to take the survey in the Notes to Volunteers.
- Complete your own Volunteer Survey to give feedback on the Journey. You can find this at the end of the Meeting Activity Plan.

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 a camera, smart phone, or video camera to document the final celebration.
- Brings snacks for the final celebration.
- Supply a CD player and music CDs for the final celebration.

Award Connection

Girls will earn two awards:

- Think Like an Engineer award
- Take Action award

They receive both awards this meeting.

(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.

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- 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 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 celebrate what they’ve learned and receive their Think Like an Engineer and Take Action awards.

Materials List

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 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

Activity 5: Closing Ceremony: Closing the Circle

- None

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Detailed Activity Plan

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

Time Allotment

10 minutes

Materials

- **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

Steps

Have girls 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 girls give a warm welcome to their guests—by saying together: *“Welcome, everyone!”*

Activity 2: Opening Ceremony: Welcome!

Time Allotment

10 minutes

Materials

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

Steps

Have girls recite the Pledge of Allegiance, Girl Scout Promise and Law, then have them introduce any special guests.

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Activity 3: Awards Ceremony and Celebration**Time Allotment**

35 minutes

Materials

- 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.)

Steps

Girls 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 prototypes from the Design Challenges.

Ask girls to stand in front of their audience.

SAY:

Can each of you give an example of something you learned on this Journey?

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

Multi-Level Tip: Older girls are more likely to speak about what they learned on the Journey. Adjust for younger girls by asking them what they had the most fun doing on the Journey.

SAY:

Please step forward when I say your name to accept your awards.

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

SAY:

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.

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And you have 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—that the girls decided to do as part of the celebration.

Activity 4: Girl Survey

Time Allotment

Allow 10 minutes if you are doing the survey during the last meeting.

Materials

- 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

Steps

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

SAY:

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.

(Note to Volunteers: 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.)

Activity 5: Closing Ceremony: Closing the Circle

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Time Allotment

10 minutes

Materials

- None

Steps

Have girls and guests stand in a Friendship Circle. Girls lead the Closing Ceremony.

SAY:

The girls would like to end this Journey together with a Closing Ceremony.

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

SAY:

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

End the meeting with a Friendship Squeeze with girls and guests.

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



DESIGN SQUAD GLOBAL is produced by WGBH Boston

MAJOR FUNDING



PROJECT FUNDING



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.

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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

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

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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 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

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