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Activity 1: As Girls Arrive: Engineers Create

Time Allotment

10 minutes

Materials

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

Scissors

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

Glue

Steps

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

SAY:

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

Cut out photos of things you think were designed by an engineer.

Stick your photos up on the poster board.

Activity 2: Opening Ceremony: Jump into Design Thinking!

Time Allotment

20 minutes

Materials

Flag

Design Thinking Process poster

Optional: Poster Board with the Girl Scout Promise and Law

Steps

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

Recite the Pledge of Allegiance and the Promise and Law.

Conduct any troop business.

SAY:

On this Journey, you'll find out what engineers do and how they help people.

SAY:

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.

When you arrived, you cut and pasted photos of things you think an engineer created. Share what

you cut out and explain why you think an engineer designed it.

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

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: Paper Structure

Time Allotment

35 minutes

Materials

Design Thinking Process poster

For each pair of girls:

Masking or duct tape

8 sheets of newspapers

Four or 5 heavy books

1 piece of cardboard (about the size of a piece of copy paper); use it as a platform for the books.

Twelve-inch ruler to measure height of the structure

Paper and pencil

Steps

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

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

Set Up. (5 minutes)

Set up the Design Challenge.

SAY:

One of the things engineers do is to build structures out of materials. Can you think of some materials they use to build things? (Girls may say: Steel, wood, plastic, concrete, iron, etc.)

Your challenge is to design and build a structure out of paper that is strong enough to support the weight of these books.

Pass books around so Juniors can feel their weight.

Brainstorm and Design (10 minutes)

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

SAY:

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

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

Then make a loosely rolled tube and ask girl to compare it to the tightly rolled tube.

What do they notice?

Bend the tightly rolled to create a triangle shape. Make another tightly rolled tube and bend it to create a square or rectangle shape.

Have Juniors test both shapes.

SAY:

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

With your team partner, begin your Design Thinking Process by brainstorming how you want to build your paper structure. You can sketch or write your ideas on paper.

Your structure should be at least 8-inches tall. Use your rulers.

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

SAY:

How can you assemble the tubes to make a strong, stable structure?

How can you support the structure to keep it from tilting or twisting when you place a heavy book on it?

How can you use the cardboard as a platform for the books?

Build and Test. (15 minutes)

Have Juniors build the structure and test it by carefully setting a book on it.

Ask girls to observe what happens and redesign and rebuild the structure if necessary.

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

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

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

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

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

If Juniors say: *The structure collapses.*

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

If Juniors say: *It wobbles.*

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

Share and Reflect. (5 minutes)

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

SAY:

What made your paper structure especially strong?

What problems did you run into--and how did you solve them?

How did have a partner to work with help with the designing and building?

Would it have been hard to design and build your paper structure alone? Why?

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

Time Allotment

10 minutes

Materials

None

Steps

Have Juniors form a Friendship Circle. Tell them that they will be creating a Take Action project and make a connection to paper and the environment. Tell Juniors about the Journey awards they'll earn.

Begin by talking to girls about paper and the environment. It might inspire a Take Action project.

SAY:

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

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

Where does paper come from?

What happens to old newspaper after we're done using it?

Why might it be a good idea to build something like this structure out of paper? Why might it be a bad idea?

Can you think of other resources or materials that we throw away that could be reused to make something else?

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

Did our talk about paper and the environment give you any ideas for a Take Action project?

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

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

End the meeting with a Friendship Squeeze.

Activity 1: As Girls Arrive: Design Like an Engineer

Time Allotment

10 minutes

Materials

Paper

Crayons or colored markers

Steps

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

SAY:

Today you'll use your engineering design skills to build an emergency shelter.

Right now, sketch a building you think an engineer would design. It can be a tree house, a shelter, a skyscraper, a mall, or anything else you think of.

Activity 2: Opening Ceremony: Engineers to the Rescue!

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.

Talk about how engineers help people.

Share the **Design Thinking Process poster**.

SAY:

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

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

Have girls share the building designs they sketched when they arrived.

Activity 3: Design Challenge: Emergency Shelter

Time Allotment

35 minutes

Materials

Handout of **Examples of Shelters (Note to Volunteers:** Don't show this until after Juniors have

designed their shelters.)

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

2-4 cardboard sheets (roughly the size of copy paper)

16 five-foot bamboo plant stakes or wooden dowels (these are available at garden centers and hardware stores. If unable to find, look for bendable plastic or aluminum rods or poles.)

3-4 large garbage bags, cut open into sheets

Scissors

Duct tape

String

Paper and pencil

(Note 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.)*

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.

SAY:

Today you'll design and build an emergency shelter. Your shelter must be sturdy enough to fit at least one person. (Or a doll, if you adapted the activity for a doll-size shelter.)

*What is an emergency shelter? Who might need one, and why? (**Girls may say:** Hikers, campers, homeless people, or people who were caught in a natural disaster)*

There are many reasons people might need temporary shelters. Each year, natural disasters like hurricanes, earthquakes, floods, fires, and tornadoes destroy the homes of millions of people around the world.

Engineers and inventors help rebuild lives by inventing and designing temporary housing that can be built quickly, easily, and cheaply, so that people can have a safe place to live.

How can you make sure your design conserves energy by keeping heat in when it's cold outside?

Brainstorm and Design. (10 minutes)

Divide Juniors into teams of 3-4 girls to design and build their Emergency Shelter prototype.

Remind Juniors that prototyping should be done quickly. That gives them time to test the prototype and, if it doesn't work, redesign — maybe several times.

SAY:

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

What features would make for a good shelter?

What would be fairly speedy to build? Remember, this is an emergency!

How will you make a sturdy frame?

How will you connect the poles that make up the frame?

How will you attach the cover to the frame?

How will you get in and out of your shelter?

Build and Test. (15 minutes)

As Juniors start making their prototypes, float around the room and observe.

Encourage Juniors to try lots of different solutions to see what works and doesn't work.

Remember, the goal is to practice thinking like an engineer, NOT to make a perfect a perfect emergency shelter.

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

If Juniors say: *The frame is collapsing.*

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

If Juniors say: *The frame tilts or twists.*

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

If Juniors say: *The sheeting keeps slipping off.*

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

Share and Reflect. (5 minutes)

Show Juniors the **Examples of Shelters** handout. (**Note to Volunteers:** It's important to show this to Juniors after they've designed so they can use their creativity to come up with new solutions.

The activity is not to build a design they've been given, but to come up with their own ideas.)

Have each team present their shelter. Start by saying who the shelter was designed for and how it will help them.

Have the teams comment on each other's shelters.

SAY:

What do you think is the best feature of this team's design? Why?

What design changes would improve this team's shelter? Why would that be an improvement?

*Do you see a solution in **Examples of Shelters** that you didn't think of? Which one and how would you use it next time?*

What was it like working in a team? What made it easier? What made it harder?

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Activity 4: Closing Ceremony: Brainstorming Our Take Action Project

Time Allotment

10 minutes

Materials

List of Juniors' Take Action ideas from Think Like an Engineer PT. 1

Take Action Guide handout

Steps

Have Juniors form a Friendship Circle and brainstorm Take Action projects.

SAY:

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

Write down Juniors' ideas.

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

End the meeting with a Friendship Squeeze.

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?

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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.

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

Think Like an Engineer 5

Activity 1: As Girls Arrive: Power Poster

- Poster board
- Colored markers

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

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

Activity 3: Creating Our Take Action Project

- Any materials Juniors need for their Take Action project

Think Like an Engineer 6

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

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

Activity 2: Opening Ceremony: Welcome!

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

Activity 3: Awards Ceremony and Celebration

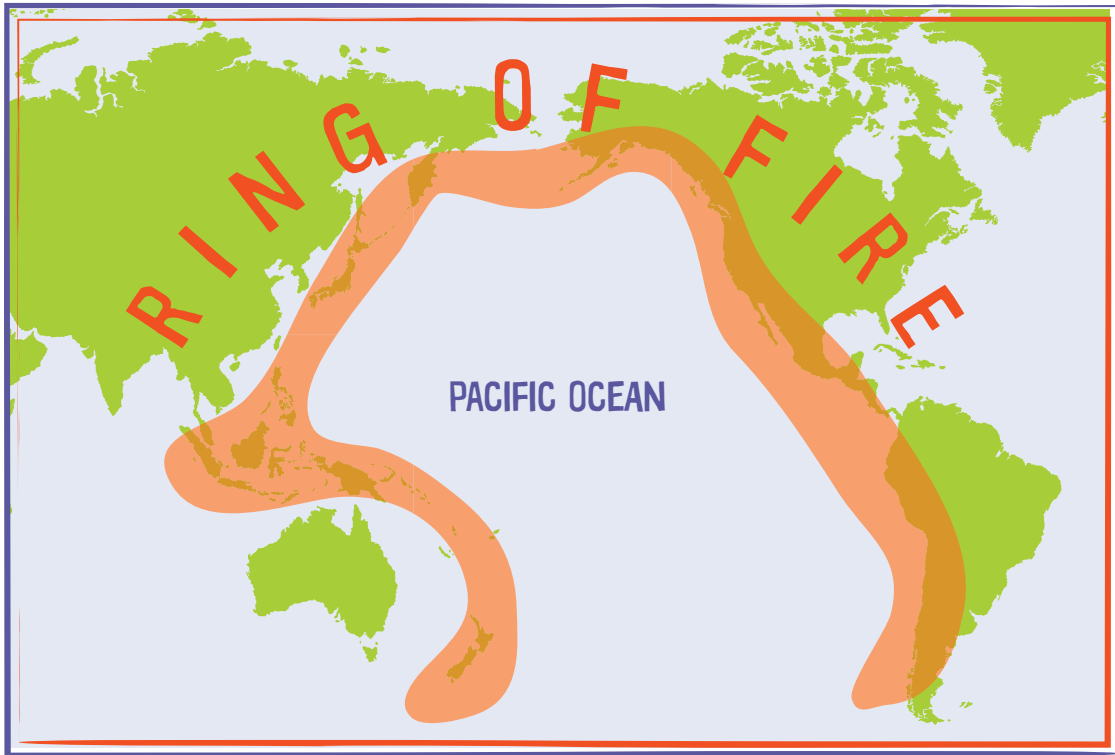
- Think Like an Engineer award
- Take Action award

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

Activity 4: Girl Survey

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

RING OF FIRE



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



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Think Like an Engineer Journey

Take Action Guide

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

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

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

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

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

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

Here's how girls might address these issues:

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

What are the steps of a Take Action project?

Girls team up to:

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

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

How do girls make their project sustainable?

Here are three ways to create sustainable change:

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

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

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

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

Engineering/STEM Take Action Ideas

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

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

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

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

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

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

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

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

Other Ideas for Take Action

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

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

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

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

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

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

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

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

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

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

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

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

Need more ideas?

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

33 Ways to Take Action!

Make your solution permanent.

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

Educate and inspire others to be part of the change.

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

Change a rule, regulation or law.

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

THE DESIGN PROCESS

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



DEFINE THE NEED



BRAINSTORM



DESIGN



BUILD



REDESIGN



TEST & EVALUATE



SHARE SOLUTIONS



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Think Like an Engineer Journey

How to Build a Shake Table

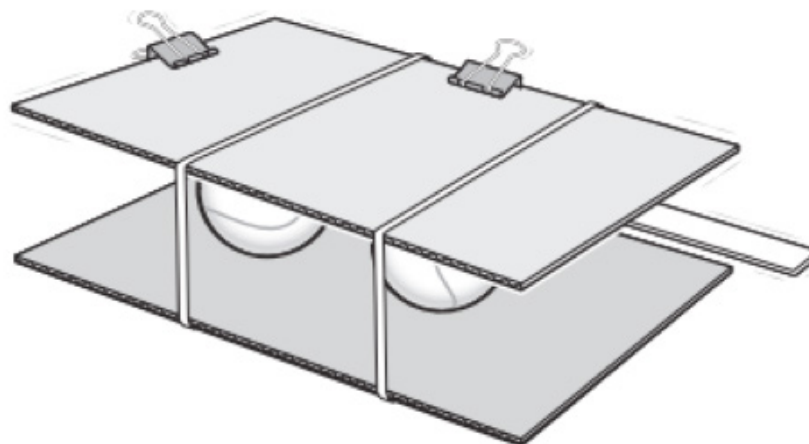
Volunteer: In advance, make one Shake Table for each team of girls. A Shake Table is a device engineers use to stimulate the back-and-forth shaking of an earthquake.

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.

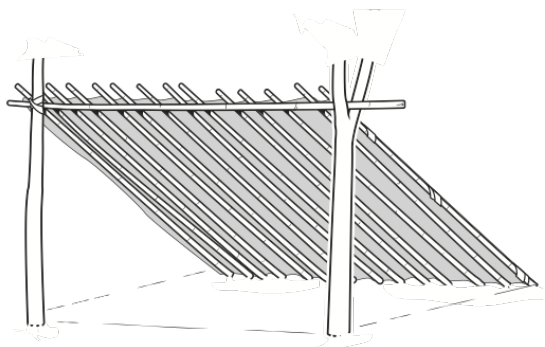


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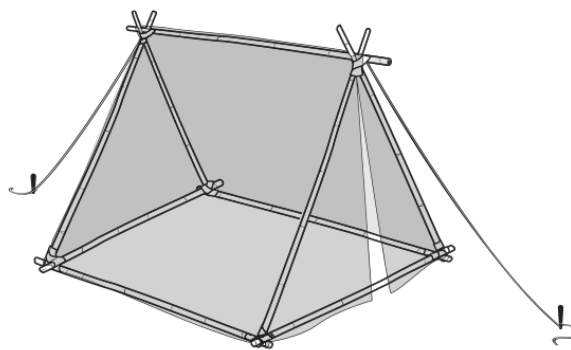
Think Like an Engineer Journey



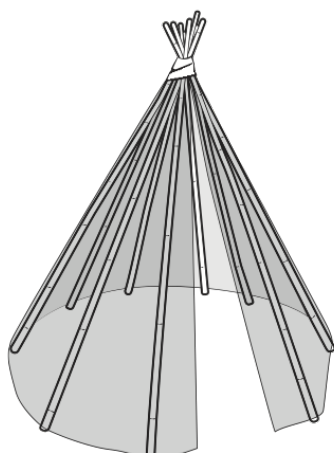
Examples of Shelters



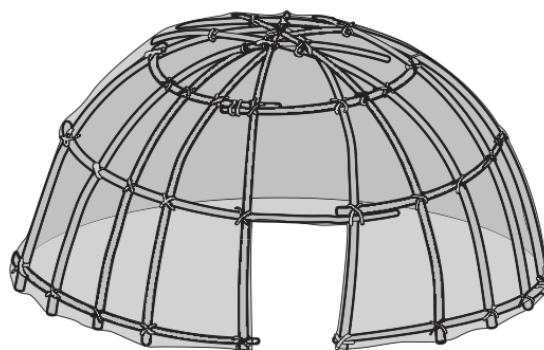
Lean-To Shelter Tent



A-Frame Tent



Cone-Shaped Tent (Tipi)



Dome-Shaped Tent

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