Design a Robot 1

Overview

In Design a Robot, Daisies design a prototype of a robot. They define a problem that their robot can fix, brainstorm what features and parts their robot might need, design their robots, and build prototypes. Daisies also share their robots with one another to learn about giving and receiving feedback.

Step One: Plan your robot
Step Two: Create a prototype (To be completed in Design a Robot 2)
Step Three: Get feedback on your robot (To be completed in Design a Robot 2)

In this meeting, Daisies brainstorm, sketch, and begin to build robots that solve everyday problems. Daisies complete Step One and begin Step Two of the Design a Robot badge.

Note to Volunteers:

Follow the Program Progression: The new STEM program has been designed to give girls a progressive learning experience. For that reason, it's highly recommended that girls begin their engineering program with the *Think Like an Engineer* Journey. On that Journey, girls will learn design thinking (how engineers solve problems and invent new things). The design thinking skills they develop will come in handy as they do activities to earn their robotics badges.

In addition, the robotics badges were designed to be done in a specific order. For Daisies, the badge progression is:

1. What Robots Do
2. How Robots Move
3. Design a Robot

Enhance the Experience: The robotics badges were designed to be "unplugged" — in other words, you don't need to buy robotics kits for girls to earn these badges. This was done intentionally. We want *every* girl to have the opportunity to earn these badges, even if she (or her troop) doesn't have the resources to buy kits. However, if you have access to kits, feel free to have girls use them to complete the badge steps where appropriate.

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 Daisies have fun in Girl Scouts and keep coming back.

"Learning by doing" and "cooperative learning" are built into this Badge, 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 Daisies know they can make choices and have their voices heard.

Invent the Future — with Imagination: Every day, there's another news story about robots that have been invented to do jobs that are too dirty, dangerous or dull for humans. Robots can now do everything from vacuuming your rug to exploring Mars to herding cattle to performing surgery. Encourage Daisies to use their imaginations when they design their own robots. No job is too small, too big, or too whimsical for a robot to take on!

Leave Time for the Closing Ceremony: If Daisies 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 Daisies leave a meeting, they'll remember how much fun it was to make a robot out of cardboard. However, they may not realize that they just learned about robotics — unless you tell them.

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

- Pointing out how they acted as engineers when they designed their robot and acted as programmers when they decided what the robot would do.
- Telling Daisies that they already have the imagination and problem-solving skills to build robots.
- Letting them know that they have what it takes to continue exploring STEM.
    -

These simple messages can boost Daisies' 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 Daisies will remember their whole lives. Try to capture those memories with photos or videos. Daisies love remembering all they did — and it's a great way for parents to see how Girl Scouting helps their Daisies!

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 (Roughly 60 minutes)

1. **Review vocabulary (2 minutes)**

This meeting includes the following vocabulary:

- **Prototype** — a quick way to show an idea to others or to try it out. It can be as simple as a drawing or it can be created with common materials such as cardboard, paper, string, rubber bands, etc.
- **Algorithm** — a set of step-by-step instructions for how to do something.
- **Program** — an algorithm that has been coded into something that can be run by a machine.
- **Debugging** — finding and fixing issues in code.

See the **Daisy Robotics Badges Glossary** for more vocabulary and examples.

2. **Read through this guide and handouts (15 minutes)**

This will help you get familiar with the flow of the meeting.

The following handouts can be found in Meeting Aids.

- **Daisy Robotics Badges 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 Badge.

- **Daisy Robotics Badges Glossary:** This is a list of words that Daisies 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.

3. **Gather materials (40 minutes)**

Gather materials using the Materials List for this meeting. If your meeting location doesn't have a flag, bring a small one that Daisies can take turns holding or hang in the room.

If you have a robotics kit, please feel free to use it instead of the more common materials in Activity 4: Create a Prototype.

Design a Robot 1

Get Help from Your Family and Friends Network

Your Friends and Family Network can include:

- Daisies' 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, robotics kits, or other materials for Activity 4: Create a Prototype.

Award Connection

Daisies will earn one award:

- Design a Robot badge

Daisies receive the award following the completion of all three steps in **Design a Robot 2.**

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

Meeting Length

60 minutes

- The times given for each activity will be different depending on how many Daisies are in your troop.
- There is no snack time scheduled in these meetings. If girls need a snack, add 15 minutes to the overall time for the meeting.
- Give Daisies 10- and 5-minute warnings before they need to wrap up the last activity so you'll have time for the Closing Ceremony.

Materials List

Activity 1: As Girls Arrive: How Can I Help?

- None

Activity 2: Opening Ceremony: Designing Robots

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

Activity 3: Plan Your Robot

- Paper

- Markers, pens, or pencils

Activity 4: Create a Prototype
(Note to Volunteers: Girls will be creating prototypes of their robots. Materials can vary by what you have available. If you have a robotics kit, please feel free to use it.)

- Pipe cleaners
- String
- Toilet Paper rolls
- Straws
- Cardboard
- Construction Paper
- Brass fasteners
- Tape
- Safety Scissors
- Glue
- Markers, pens, or pencils
- **Optional:** Robot parts like gears, pulleys, or screws for girls to include.

Activity 5: Closing Ceremony: Flash Chat

- None

Awards
Girls do not receive any awards in this meeting.

Detailed Activity Plan

Activity 1: As Girls Arrive: How Can I Help?

Time Allotment
10 Minutes

Materials

- None

Steps
(Note to Volunteers: This activity is meant to start Daisies' thinking about different problems. In this Badge, Daisies will be creating a prototype for a robot that solves an everyday problem.)

Welcome Daisies, and have them pair up.

Daisies learn about their partner, asking what problems they encounter and brainstorming how they could help.

SAY:
Talk to your partner, and ask her about her day.

What are problems she faces? What are some ways you could help?

Activity 2: Opening Ceremony: Designing Robots

Time Allotment
10 Minutes

Materials
- Flag
- 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 what robots can do with Daisies.

SAY:
Can anyone remind us of some of the things robots can do?

Girls may say: Robots can help clean the house, robots can go to other planets, etc.

Robots do tasks that are often too hard, boring or dangerous for humans to do. As you know, robots are made up of many different parts that together create a robot that can move and follow algorithms (sets of instructions).

Today, we are going to be engineers as we plan and design our own robots to solve some of our everyday problems.

Activity 3: Plan Your Robot

Time Allotment
10 Minutes

Design a Robot 1

Materials

- Paper
- Markers, pens, or pencils

Steps

Daisies sketch ideas for a robot that solves an everyday problem for Step One of the Design a Robot badge.

SAY:

What is a something you do every day that might not be your favorite thing?

Girls may say: I don't like waking up in the morning, I have to do the dishes, I have to clean up my toys, etc.

How could a robot help you with this? What could it do?

Girls may say: A robot could wake me up, a robot could wash dishes, a robot could organize my toys, etc.

Wow, robots could really help us with solving lots of problems!

Can you choose one problem to design a robot for? Think about the problems you just mentioned and the conversation you had earlier with your Daisy friend.

Give Daisies 30 seconds to choose a problem to focus on.

SAY:

Now that we know what we want our robots to do, we need to figure out how to make them come to life. First, we're going to create lots of sketches of our robots, just like engineers!

Hand out paper and markers, pens, or pencils to the girls.

Have Daisies quick-sketch their robots.

Encourage Daisies to use multiple pieces of paper. Explain that these first sketches should be "quick" so they can draw all of their different ideas before choosing one to build into a prototype.

As they draw, remind Daisies that their robots need to have special parts. Some of the most important robot parts they can include are:

- Gears to move the larger parts of the robot in one direction or the other.

- Levers to open and close parts of the robot.
- Pulleys to help the robots lift things.
- Wheels to move the robot around.
- Nuts, bolts, and screws to keep the different pieces together.

Remind Daisies that they need to be able to answer the question: What does my robot do?

Once each girl has several different ideas on her paper(s), organize Daisies into groups of 2-4 girls.

Daisies share their sketches with their group, making sure that everyone has a chance to tell their fellow Daisies about the robots they drew.

Girls who finish quickly can ask each other questions about their robots.

Once all groups have discussed, bring everyone back together, and remind Daisies how they are thinking and working like engineers.

SAY:
You brainstormed and designed your robots, just like engineers!

First, you thought about what your robot will do, or its purpose, by looking at what you need help with in your day to day life.

Then, you made lots of different sketches to brainstorm how best to design your robot.

After, you discussed your ideas with each other.

Engineers do the very same thing when they want to build something. First, they look for problems or find needs. Then the plan and sketch ways to solve that problem. After, they share their ideas with others for feedback.

Next, you're going to create a 3-D model of a robot!

Activity 4: Create a Prototype

Time Allotment
20 Minutes

Materials

(Note to Volunteers: Girls will be creating prototypes of their robots. Materials can vary by what you have available. If you have a robotics kit, please feel free to use it.)

- Pipe cleaners
- String
- Toilet Paper rolls
- Straws
- Cardboard
- Construction Paper
- Brass fasteners
- Tape
- Safety Scissors
- Glue
- Markers, pens, or pencils
- **Optional:** Robot parts like gears, pulleys, or screws for girls to include.

Steps
Daisies choose one of their sketches and build a 3D prototype for Step Two of the Design a Robot badge.

SAY:
Now, choose one of your robot sketches. This should be the one you think will do the best job of dealing with your problem.

Give Daisies about 30 seconds to choose one of their sketches.

SAY:
Take your robot idea one step further, and create a prototype, just like engineer!

Does anyone know what a prototype is?

Girls may say: A practice product, I don't know, etc.

A prototype is a quick way to show an idea to others or to try it out. It can be as simple as a drawing or it can be created with common materials such as cardboard, paper, string, rubber bands, etc.

You created lots of quick prototypes when you created sketches of all your robot ideas.

However, engineers don't just build their robot off their first sketch. They gather feedback from others, just like you did, and improve the design of their robot over and over until they think it will work just like they want it to.

Now, let's make your robots!

Hand out supplies to the Daisies. Remind Daisies to always be careful, safe and aware when handling blades.

Daisies create prototypes of their robots.

As the girls work, circle around to help as needed. However, if girls start to ask you how to fix certain things, encourage them to find the answer themselves by asking them questions like “What parts do you want to include in your robot? How could you make those with these supplies?”

At the end of the activity, tell Daisies that they will continue to work on their prototypes next time.

SAY:
You did a good job creating the body of your robot today!

Next time, you're going to create a program for your robot.

In the meantime, you can think about the steps your robot will have to take to do its job. Remember, your program will need to have every step to run without bugs!

(**Note to Volunteers:** You will need to save the Daisies’ prototypes for the next meeting, Design a Robot 2. Label each robot prototype with the girl or group’s name(s), and put away until the next meeting. Additionally, girls will have more time to build in Design a Robot 2, so take a look at the prototypes before the next meeting and think about what other materials you could bring.)

Activity 5: Closing Ceremony: Flash Chat

Time Allotment
10 Minutes

Materials
- None

Steps
Have Daisies form a Friendship Circle to discuss what they learned.

SAY:
What did we do today?

Did you like being an engineer?

Did it help to share your ideas with each other?

What problem is your robot going to solve? What does it do?

What was the hardest part about creating your robot? How did you tackle this?

What was your favorite part about the day's activities? Let's go around the circle so every girl gets a chance to say something.

End the meeting with a Friendship Squeeze.

Robotics Badges
Glossary for Daisies

Daisies may not know some of the words used in these badges. Here are definitions you can share with them:

A **robot** is a machine capable of carrying out a complex series of actions automatically, especially a machine programmed by a computer.

Engineers are people who solve problems. They're creative — they use their imaginations to build bridges, buildings, planes, and roads. And they're practical — they invent real things that can be used in the real world, like computers, TVs, and phones.

An **algorithm** is a list of steps that you can follow to finish a task. A recipe is an example of an algorithm; it tells you how to cook a dish by following step-by-step instructions.

A **program** is an algorithm that has been coded into something that can be run by a machine.

Debugging is finding and fixing problems in your algorithm or program.

A **prototype** is a sample when you want to show someone your idea. It could be a drawing or something you make to show what your idea looks like.

Daisy Robotics Badges: Materials List

What Robots Do 1

Activity 1: As Girls Arrive: Pin the Antenna on the Robot

- Draw a simple sketch of a robot on a large piece of paper
- Strips of tin foil
- Masking tape
- Blindfold

Activity 2: Opening Ceremony: Discovering Robots

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

Activity 3: Learn About Robots

- Find and print out about ten images of robots and non-robots. Five should be pictures of robots the girls know/are familiar are with from pop culture (I.e. Wall-E, C3PO, R2D2, etc.) or pictures of real robots (I.e. Mars Rovers, Roomba, etc.). Five should be things that are not robots. (**Note to Volunteers:** You can add in trick examples or more images of each to up the difficulty level.)
- Prior to the meeting, tape the images around the room in visible, but not very easily seen, places.

Activity 4: Find Out What Robots Can Do

- Paper
- Markers, pens, or pencils
- Option 1: Engineering for the Red Planet and LEGO® Robots videos, downloaded or with ability to stream on device (computer, smartphone, tablet, etc.)
- Option 2: Find and print photos of the Mars Rovers, LEGO robots, or other robots.

What Robots Do 2

Activity 1: As Girls Arrive: Helping One Another

- Markers for Activity 3: Team Up to Design Your Own Robots
- Cups
- Paper

Activity 2: Opening Ceremony: Robots Solve Problems

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

Activity 3: Team Up to Design Your Own Robots

- Paper
- Markers, pens, or pencils
- Robot drawings girls created on their own for Step 2 in What Robots Do 1

Activity 4: Closing Ceremony: Awards

- What Robots Do award

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

Daisy Robotics Badges: Materials List

How Robots Move 1

Activity 2: Opening Ceremony: Robots Solve Problems

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

Activity 3: Learn About the Parts of a Robot

- Robot parts like wheels, gears, levers (tongs, scissors, cardboard and brass fasteners, etc.), nuts and bolts, screws, pulleys (paperclip & string), or anything else you have that could be used in a robot. (Note to Volunteers: If you do not have some of the items, print pictures. However, as girls will be encouraged to play with the items, this is not recommended.)
- String
- Cardboard
- Masking tape
- Markers, pens, or pencils
- Prior to the meeting or activity, organize the robot parts around the room for Daisies to discover.

How Robots Move 2

Activity 1: As Girls Arrive: Rainbow Algorithms

- Paper
- Markers, crayons, or colored pencils

Activity 2: Opening Ceremony: Programming Algorithms

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

Activity 3: Make a Robot Move

- Prepare masking tape trails made of right angles (one for each group of 3-4 girls). See **Sample Robot Trails** for ideas.
- Masking tape
- Stuffed animals (one for each group of 2-4 girls)
- Prize (one for each group of 2-4 girls). This can be anything (snack, WRAP, etc.)
- Board or flipchart to write on
- **Happy Map Arrows** (one sheet for each group of 2-4 girls)
- Scissors
- Optional: **Worksheet: Move the Flurbs** (one for each girl)
  An "assessment worksheet" sounds a lot like school, but girls will probably see this as a fun puzzle page. If there's time, girls could do the activities in the meeting or you could give each girl a copy to take home. Perhaps they'd like to show their families what they learned about programs and algorithms by doing the worksheet together

Activity 4: Closing Ceremony: Awards

- How Robots Move award

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Daisy Robotics Badges: Materials List

Design a Robot 1

Activity 2: Opening Ceremony: Designing Robots

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

Activity 3: Plan Your Robot

- Paper
- Markers, pens, or pencils

Activity 4: Create a Prototype

(**Note to Volunteers**: Girls will be creating prototypes of their robots. Materials can vary by what you have available. If you have a robotics kit, please feel free to use it.)

- Pipe cleaners
- String
- Toilet Paper rolls
- Straws
- Cardboard
- Construction Paper
- Brass fasteners
- Tape
- Scissors
- Glue
- Markers, pens, or pencils
- Optional: Robot parts like gears, pulleys, or screws for girls to include.

Design a Robot 2

Activity 1: As Girls Arrive: Program Your Prototype

- Robot prototypes created by Daisies in Design a Robot 1
- Paper
- Markers, pens or pencils

Activity 2: Opening Ceremony: Engineering Prototypes

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

Activity 3: Get Feedback on Your Robot

- Robot prototypes created by Daisies in Design a Robot 1
- Robot programs created by Daisies in Activity 1: As Girls Arrive: Program Your Prototype
- Optional: Materials for girls to redesign and improve their prototypes

Activity 4: Closing Ceremony: Awards

- Design a Robot award

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

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.

girl scouts

The Girl Scout Promise

On my honor, I will try:

To serve God and my country,

To help people at all times,

And to live by the Girl Scout Law.

The Girl Scout Law

I will do my best to be

honest and fair,

friendly and helpful,

considerate and caring,

courageous and strong, and

responsible for what I say and do,

and to

respect myself and others,

respect authority,

use resources wisely,

make the world a better place, and

be a sister to every Girl Scout.

Design a Robot 2

Overview

In Design a Robot, Daisies design a prototype of a robot. They define a problem that their robot can fix, brainstorm what features and parts their robot might need, design their robots, and build prototypes. Daisies also share their robots with one another to learn about giving and receiving feedback.

Step One: Plan your robot (Completed in Design a Robot 1)
Step Two: Create a prototype
Step Three: Get feedback on your robot

This meeting, Daisies create a program, finish building, and share their prototypes for robots that solve everyday problems. Daisies complete Step Two & Step Three, earning the Design a Robot badge.

Note to Volunteers:

Follow the Program Progression: The new STEM program has been designed to give girls a progressive learning experience. For that reason, it's highly recommended that girls begin their engineering program with the *Think Like an Engineer* Journey. On that Journey, girls will learn design thinking (how engineers solve problems and invent new things). The design thinking skills they develop will come in handy as they do activities to earn their robotics badges.
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1. What Robots Do
2. How Robots Move
3. Design a Robot

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Here's why: When Daisies leave a meeting, they'll remember how much fun it was to make a robot out of cardboard. However, they may not realize that they just learned about robotics — unless you tell them.

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- Pointing out how they acted as engineers when they designed their robot and acted as programmers when they decided what the robot would do.
- Telling Daisies that they already have the imagination and problem-solving skills to build robots.
- Letting them know that they have what it takes to continue exploring STEM.

These simple messages can boost Daisies' 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 Daisies will remember their whole lives. Try to capture those memories with photos or

videos. Daisies love remembering all they did — and it's a great way for parents to see how Girl Scouting helps their Daisies!

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 (Roughly 50 minutes)

1. **Review vocabulary (2 minutes)**

This meeting includes the following vocabulary:

- **Prototype –** a quick way to show an idea to others or to try it out. It can be as simple as a drawing or it can be created with common materials such as cardboard, paper, string, rubber bands, etc.
- **Algorithm –** a list of steps that you can follow to finish a task.
- **Program** — an algorithm that has been coded into something that can be run by a machine.
- **Debugging** — finding and fixing issues in code.

See the **Daisy Robotics Badges Glossary** for more vocabulary and examples.

2. **Read through this guide and handouts (15 minutes)**

This will help you get familiar with the flow of the meeting.

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- **Daisy Robotics Badges Glossary:** This is a list of words that Daisies 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.

3. **Gather materials (30 minutes)**

Gather materials using the Materials List for this meeting. If your meeting location doesn't have a flag, bring a small one that Daisies can take turns holding or hang in the room.

Design a Robot 2

Get Help from Your Family and Friends Network

Your Friends and Family Network can include:

- Daisies' 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 or other materials for Daisies to improve their robot prototypes this meeting.

Award Connection

Daisies will earn one award:

- Design a Robot badge

Daisies receive the award following the completion of Step Two & Step Three this meeting**.**

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

Meeting Length

60 minutes

- The times given for each activity will be different depending on how many Daisies are in your troop.
- There is no snack time scheduled in these meetings. If girls need a snack, add 15 minutes to the overall time for the meeting.
- Give Daisies 10- and 5-minute warnings before they need to wrap up the last activity so you'll have time for the Closing Ceremony.

Materials List

Activity 1: As Girls Arrive: Program Your Prototype

- Robot prototypes created by Daisies in Design a Robot 1
- Paper
- Markers, pens or pencils

Activity 2: Opening Ceremony: Engineering Prototypes

- Flag

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

Activity 3: Get Feedback on Your Robot

- Robot prototypes created by Daisies in Design a Robot 1
- Robot programs created by Daisies in Activity 1: As Girls Arrive: Program Your Prototype
- **Optional:** Materials for girls to redesign and improve their prototypes

Activity 4: Closing Ceremony: Awards

- Design a Robot award

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

Detailed Activity Plan

Activity 1: As Girls Arrive: Program Your Prototype

Time Allotment
10 Minutes

Materials

- Robot prototypes created by Daisies in Design a Robot 1
- Paper
- Markers, pens or pencils

Steps
Welcome Daisies, and have them draw a program for their robot prototype to complete Step Two of the Design a Robot badge.

Hand out the robot prototypes Daisies created in Design a Robot 1.

SAY:
Last time, we made the body of our robot.

However, what do we still need to do to make them move? **(Answer: Program them.)**

We need to create a program so they can follow our instructions, move, and act!

Can you draw a program for your robot? Remember, you have to include every step the robot would have to take to solve the problem you chose.

For example, if your robot was washing the dishes, it might: 1) Turn on the sink, 2) Pick up a plate, 3) Soap and rinse the plate, 4) Dry the plate, 5) Put down the plate, 6) Repeat.

Daisies create a program for their robots. They should have 3-5 steps to keep it simple.

Circle around as Daisies work, and note where there might be gaps in their algorithms, encouraging them to add more steps as needed.

Activity 2: Opening Ceremony: Engineering Prototypes

Time Allotment
10 Minutes

Materials
- Flag
- 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.

Remind Daisies how they've been working like engineers.

SAY:
How does it feel to be an engineer?

You've done a great job going through the same steps engineers take to design something.

First, you looked at all the different problems there are and chose one to focus your design on.

Then, you created lots of sketches and chose the one the best solves your problem.

After, you built a 3-D model, or a prototype, of your robot.

Now, you've created the program for your robot, so you're ready to test!

Activity 3: Get Feedback on Your Robot

Time Allotment
30 Minutes

Materials

- Robot prototypes created by Daisies in Design a Robot 1
- Robot programs created by Daisies in Activity 1: As Girls Arrive: Program Your Prototype
- **Optional:** Materials for girls to redesign and improve their prototypes

Steps
Daisies test, share, and improve their robot prototypes for Step Three of the Design a Robot badge.

SAY:
Great job designing and prototyping your robot!

Once engineers create the first prototype of their robot, they have to test it to make sure it works like they planned.

Next, you're going to test your robots in pairs.

Break Daisies into pairs. In each pair, girls will take turns to be the "Programmer" (the girl who created the prototype) and the "Robot" (the other girl who did not create the prototype for this turn).

The Programmer tests her prototype by giving her program (instructions) to the “Robot” to follow, one step at a time. The “Robot” moves the Programmer's prototype per the instructions.

If the Programmer finds an error in her program, she should add (draw) in the steps where they belong on her list.

Once the Programmer feels that her program is correct, the pair switches roles and repeats for the other Daisy's prototype and program.

Once everyone has had a chance to test and debug their programs (as needed), bring Daisies into a Friendship Circle to share their robot prototypes.

(Note to Volunteers: You might ask Daisies to put their robot and program behind their backs so they do not get distracted as other Daisies present.)

SAY:
Testing is an important step to make sure a robot or any other machine works correctly.

When you were testing your program, did you find any problems you had to debug? How did you fix your program?

Let girls answer.

SAY:
You've done a lot of work to make sure your robots will work! Does anyone want to show us what their robot does?

Each Daisy shares her robot and program, using her last partner to help move the robot as she gives her program (instructions) aloud.

After each girl goes, encourage the group to give one thing they like about the robot and one thing she could improve.

Remind Daisies that gathering feedback is an important part of being an engineer.

SAY:
Testing, showing your robot, and asking for feedback from other engineers are all important steps to make the best robot you can.

Other engineers might have ideas to improve your robot and might even be inspired by something you made.

Once you gather feedback or results from your testing, it is up to you, the engineer, to use what you have learned to improve your robot.

Is there anything you would like to improve about your robot?

Let girls answer.

Optional: If there is enough time and/or materials, girls can go back and improve their robots, either in build or by debugging their programs.

Activity 4: Closing Ceremony: Awards

Time Allotment
10 Minutes

Design a Robot 2

Materials

- Design a Robot award

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

Steps

Have Daisies form a Friendship Circle to review what they learned before they receive their awards.

SAY:

What did you program your robot to do? Is there anything else you could program it to do?

What was your favorite step of prototyping your robot? (Identifying problems, quick-sketching, prototyping, testing, getting feedback, etc.)

What was your favorite part about the day's activities? Let's go around the circle so every girl gets a chance to say something.

Let girls answer. Make sure every girl gets a chance to speak.

Daisies receive their Design a Robot badge.

SAY:

You've now earned the Design a Robot badge.

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

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

SAY:

You have earned the Design a Robot award, which means you know how to plan, build, and share feedback like an engineer. You created a prototype of a robot that solves an everyday problem.

Encourage Daisies to share their new knowledge with others.

SAY:

When you leave here, who do you want to tell about what you learned?

Girls may say: My parents, my brothers and sisters, my friends at school.

That's great! When you learn something, it's fun to pass it on to others. We can all learn from each other.

End the meeting with a Friendship Squeeze.

Now that I've earned this badge, I can give service by:

- Sharing with others how to build a robot prototype or how programs work.

Robotics Badges
Glossary for Daisies

Daisies may not know some of the words used in these badges. Here are definitions you can share with them:

A **robot** is a machine capable of carrying out a complex series of actions automatically, especially a machine programmed by a computer.

Engineers are people who solve problems. They're creative — they use their imaginations to build bridges, buildings, planes, and roads. And they're practical — they invent real things that can be used in the real world, like computers, TVs, and phones.

An **algorithm** is a list of steps that you can follow to finish a task. A recipe is an example of an algorithm; it tells you how to cook a dish by following step-by-step instructions.

A **program** is an algorithm that has been coded into something that can be run by a machine.

Debugging is finding and fixing problems in your algorithm or program.

A **prototype** is a sample when you want to show someone your idea. It could be a drawing or something you make to show what your idea looks like.

Daisy Robotics Badges: Materials List

What Robots Do 1

Activity 1: As Girls Arrive: Pin the Antenna on the Robot

- Draw a simple sketch of a robot on a large piece of paper
- Strips of tin foil
- Masking tape
- Blindfold

Activity 2: Opening Ceremony: Discovering Robots

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

Activity 3: Learn About Robots

- Find and print out about ten images of robots and non-robots. Five should be pictures of robots the girls know/are familiar are with from pop culture (I.e. Wall-E, C3PO, R2D2, etc.) or pictures of real robots (I.e. Mars Rovers, Roomba, etc.). Five should be things that are not robots. (**Note to Volunteers:** You can add in trick examples or more images of each to up the difficulty level.)
- Prior to the meeting, tape the images around the room in visible, but not very easily seen, places.

Activity 4: Find Out What Robots Can Do

- Paper
- Markers, pens, or pencils
- Option 1: Engineering for the Red Planet and LEGO® Robots videos, downloaded or with ability to stream on device (computer, smartphone, tablet, etc.)
- Option 2: Find and print photos of the Mars Rovers, LEGO robots, or other robots.

What Robots Do 2

Activity 1: As Girls Arrive: Helping One Another

- Markers for Activity 3: Team Up to Design Your Own Robots
- Cups
- Paper

Activity 2: Opening Ceremony: Robots Solve Problems

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

Activity 3: Team Up to Design Your Own Robots

- Paper
- Markers, pens, or pencils
- Robot drawings girls created on their own for Step 2 in What Robots Do 1

Activity 4: Closing Ceremony: Awards

- What Robots Do award

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

Daisy Robotics Badges: Materials List

How Robots Move 1

Activity 2: Opening Ceremony: Robots Solve Problems

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

Activity 3: Learn About the Parts of a Robot

- Robot parts like wheels, gears, levers (tongs, scissors, cardboard and brass fasteners, etc.), nuts and bolts, screws, pulleys (paperclip & string), or anything else you have that could be used in a robot. (Note to Volunteers: If you do not have some of the items, print pictures. However, as girls will be encouraged to play with the items, this is not recommended.)
- String
- Cardboard
- Masking tape
- Markers, pens, or pencils
- Prior to the meeting or activity, organize the robot parts around the room for Daisies to discover.

How Robots Move 2

Activity 1: As Girls Arrive: Rainbow Algorithms

- Paper
- Markers, crayons, or colored pencils

Activity 2: Opening Ceremony: Programming Algorithms

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

Activity 3: Make a Robot Move

- Prepare masking tape trails made of right angles (one for each group of 3-4 girls). See **Sample Robot Trails** for ideas.
- Masking tape
- Stuffed animals (one for each group of 2-4 girls)
- Prize (one for each group of 2-4 girls). This can be anything (snack, WRAP, etc.)
- Board or flipchart to write on
- **Happy Map Arrows** (one sheet for each group of 2-4 girls)
- Scissors
- Optional: **Worksheet: Move the Flurbs** (one for each girl)
  An "assessment worksheet" sounds a lot like school, but girls will probably see this as a fun puzzle page. If there's time, girls could do the activities in the meeting or you could give each girl a copy to take home. Perhaps they'd like to show their families what they learned about programs and algorithms by doing the worksheet together

Activity 4: Closing Ceremony: Awards

- How Robots Move award

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

Daisy Robotics Badges: Materials List

Design a Robot 1

Activity 2: Opening Ceremony: Designing Robots

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

Activity 3: Plan Your Robot

- Paper
- Markers, pens, or pencils

Activity 4: Create a Prototype

(**Note to Volunteers**: Girls will be creating prototypes of their robots. Materials can vary by what you have available. If you have a robotics kit, please feel free to use it.)

- Pipe cleaners
- String
- Toilet Paper rolls
- Straws
- Cardboard
- Construction Paper
- Brass fasteners
- Tape
- Scissors
- Glue
- Markers, pens, or pencils
- Optional: Robot parts like gears, pulleys, or screws for girls to include.

Design a Robot 2

Activity 1: As Girls Arrive: Program Your Prototype

- Robot prototypes created by Daisies in Design a Robot 1
- Paper
- Markers, pens or pencils

Activity 2: Opening Ceremony: Engineering Prototypes

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

Activity 3: Get Feedback on Your Robot

- Robot prototypes created by Daisies in Design a Robot 1
- Robot programs created by Daisies in Activity 1: As Girls Arrive: Program Your Prototype
- Optional: Materials for girls to redesign and improve their prototypes

Activity 4: Closing Ceremony: Awards

- Design a Robot award

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

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.

girl scouts

The Girl Scout Promise

On my honor, I will try:

To serve God and my country,

To help people at all times,

And to live by the Girl Scout Law.

The Girl Scout Law

I will do my best to be

honest and fair,

friendly and helpful,

considerate and caring,

courageous and strong, and

responsible for what I say and do,

and to

respect myself and others,

respect authority,

use resources wisely,

make the world a better place, and

be a sister to every Girl Scout.