Overview

In the Model Car Design Challenge, Daisies learn about engineering and friction by building and testing a model car. Daisies learn how to design and test new things they invent.

**Step One:** Design and build model cars  
**Step Two:** Use model cars to test the friction of different surfaces  
**Step Three:** Race your cars! (To be completed in Model Car Design Challenge 2)

This meeting, Daisies make a Model Car out of GoldieBlox then begin to test their cars. Daisies complete Step One & Step Two of the Model Car Design Challenge badge.

**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.

This badge requires the GoldieBlox Making Things Move kit. Each kit includes 6 sets of GoldieBlox parts for the badge, (i.e. you can create 6 of any Daisy Design Challenge badge from one kit). Inside the kit are six sets of GoldieBlox parts that allow girls to earn all 3 Daisy Design Challenge badges. Two to four girls can use each set. So if you have 12 girls, buy one kit per them to work in pairs. You can purchase the kit online from the Girl Scout Shop: [http://www.girlscoutshop.com/](http://www.girlscoutshop.com/)

You will not be able to buy the correct kit from the GoldieBlox website or your council shop.

**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.

**Fail Fast. Succeed Sooner:** That’s how engineers solve problems. In this badge, Daisies will learn about engineering 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 Daisies think this way. When her 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 Daisies are free to invent things without feeling the pressure to make them perfect.

**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 build a board game or to make a car speed down a ramp. 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 Daisies 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 Daisies 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 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)

PLEASE NOTE: You will need the GoldieBlox Making Things Move kit for girls to complete the requirements and earn the badges. Details for the kit are listed in this section and on the Materials List.

1. Review vocabulary (2 minutes)

This meeting includes the following vocabulary:

- **Friction** – a force that slows moving objects.
- **Force** – the strength or energy that creates movement. Push and pull are examples of force.

See the Glossary for Daisy Design Challenge Badges 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 Design Challenge 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.

- **Glossary for Daisy Design Challenge Badges**: 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.

(Note to Volunteers: You will need the GoldieBlox Making Things Move kit for the girls to complete the requirements and earn the badges. You can purchase this from the Girl Scouts Shop: http://www.girlscoutshop.com/.)

4. Create friction stations for Activity 4: Use Model Cars to Test the Friction of Different Surfaces (15 minutes)

Before Daisies arrive for the meeting, prepare 2 or more different friction stations around the room for Daisies to test their cars on. Each station will require a different surface.

Here are some ideas for different surfaces:
- A towel laid on the floor
- Asphalt or concrete right outside the meeting room’s door
- A large piece of cardboard laid on the floor (or carpet if you have low-pile carpet)
- Vinyl flooring or a large table

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.
- Assist with Design Challenge activities.

Award Connection

Daisies will earn one award:
- Model Car Design Challenge badge

Daisies receive the award following the completion of all three steps of the badge in Model Car Design Challenge 2.
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.

In the Model Car Design Challenge, Daisies learn about engineering and friction by building and testing a model car. Daisies learn how to design and test new things they invent.

Step One: Design and build model cars
Step Two: Use model cars to test the friction of different surfaces
Step Three: Race your cars! (To be completed in Model Car Design Challenge 2)

This meeting, Daisies make a Model Car out of GoldieBlox then begin to test their cars. Daisies complete Step One & Step Two of the Model Car Design Challenge badge.

Materials List

Activity 1: As Girls Arrive: Playing with Force and Friction
- Sports and game balls (one for each pair of girls). Bring different types of balls for girls to roll and observe friction. For example, you might bring a marble, tennis ball, basketball, ping pong ball, baseball, etc.
- Create two lines with masking tape on the floor. Each Daisy should sit on the line, facing their partner.

Activity 2: Opening Ceremony: All About Friction
- Flag
- Optional: Print out pictures of a bicycle wheel (including brake pads), a golf ball on a putting green, a baseball player sliding, and a sled loaded with supplies (or other examples of friction).
Model Car Design Challenge 1

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

Activity 3: Design and Build Model Cars
- GoldieBlox Making Things Move kit (one set for each pair or small team.) (Note to Volunteers: Depending on what model car Daisies decide to build, pieces will vary. Feel free to add additional pieces from personal GoldieBlox kits that you or your Girl Scouts may own.)
- “GoldieBlox and the Parade Float” or GoldieBlox Parade Floats handout

Activity 4: Use Model Cars to Test the Friction of Different Surfaces
- Floats created in Activity 3: Design and Build Model Cars
- 2+ Friction stations for girls to test their cars (including a different surface at each station). See Prepare Ahead for more information on how to create the stations.
- Optional: Yard sticks, rulers, or string for Daisies to measure how far their cars go at each station.
- Optional: Paper and pencils if Daisies can read/write to record data.

Activity 5: Closing Ceremony: Reviewing Our Testing Results
- None

Awards
Girls do not receive any awards in this meeting.

Detailed Activity Plan

Activity 1: As Girls Arrive: Playing with Force and Friction

Time Allotment
10 Minutes

Materials
- Sports and game balls (one for each pair of girls). Bring different types of balls for girls to roll and observe friction. For example, you might bring a marble, tennis ball, basketball, ping pong ball, baseball, etc.
- Create two lines with masking tape on the floor. Each Daisy should sit on the line, facing their partner.

Steps
Prior to girls arriving, create two masking tape lines. The lines should be close enough that Daisies will be able to roll a ball back and forth between them.
As Daisies arrive, welcome them, and have them pair up.

Hand each pair a ball, and have them sit facing each other on the lines and roll their ball back and forth.

Daisies can roll their ball a few times, then exchange it with another pair to try another.

**SAY:**
Roll your ball back and forth with your partner.

What happens when you roll it lightly? Does it reach your partner?

What happens when you roll it with a lot of strength?

Daisies roll their balls, experimenting with force.

**Activity 2: Opening Ceremony: All About Friction**

**Time Allotment**
10 Minutes

**Materials**
- Flag
- Optional: Print out pictures of a bicycle wheel (including brake pads), a golf ball on a putting green, a baseball player sliding, and a sled loaded with supplies (or other examples of friction)
- 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.

Introduce Daisies to the Model Car Design Challenge badge.

**SAY:**
Today you’re going to be engineers as we start the Model Car Design Challenge!
You’ll build model cars. Then you’ll test how far they roll on different surfaces. Next time, you’ll get to improve them based on your tests and race them down ramps!

Compare how the different balls rolled in Activity 1: As Girls Arrive: Playing with Force and Friction as examples of force.

SAY:
Let’s get started and learn something important engineers have to think about when they build things.

When you were rolling your balls earlier, what made the balls move faster? (Answer: Rolling it with more strength or force.)

When you were rolling your balls earlier, what made the balls move slower? (Answer: Using less strength or force.)

Each time you rolled the ball, you changed the amount of force you used. Force is the amount of strength or energy it takes to move something.

Explain friction to Daisies, using the different balls used in Activity 1: As Girls Arrive: Playing with Force and Friction.

SAY:
Were there any balls that were easier or harder to roll? Why do you think that was?

Girls may say: It was hard to roll the tennis ball on the carpet, the ping pong ball went the fastest, etc.

Each of the balls is made of a different material and weighs a different amount.

For example, the smaller balls may have been easier to roll. Why do you think that is? (Answer: The smaller balls were lighter, so the surface affected it less as it moved.)

When you roll the ball, there is something called friction that stops the ball.

Friction is a force that slows and stops moving objects. Without friction, any object that was pushed or pulled would keep moving forever!

Depending on the ball, there were different amounts of friction at play. For example, there was less friction on the smaller balls, allowing them to move faster than big balls.
Have Daisies quickly predict how they think cars will move on different surfaces.

**SAY:**
Do you think a toy car would move as fast on asphalt as it would on carpet? Let’s take a vote!

Have girls close their eyes and raise their hands to vote “yes” or “no.”

Count the number of “no” and “yes” answers, and tell the Daisies aloud how the troop voted.

**SAY:**
Would anyone who voted “no” like to guess which surface will allow the car to travel farthest or fastest?

Have the Daisies give ideas.

**SAY:**
Today, we’ll use the GoldieBlox to find out!

---

**Activity 3: Design and Build Model Cars**

**Time Allotment**
15 Minutes

**Materials**
- GoldieBlox Making Things Move kit (one set for each pair or small team.) *(Note to Volunteers: Depending on what model car Daisies decide to build, pieces will vary. Feel free to add additional pieces from personal Goldieblox kits that you or your Girl Scouts may own.)*
- “GoldieBlox and the Parade Float” or GoldieBlox Parade Floats handout

**Steps**

Daisies build cars for Step One of the Model Car Design Challenge.

**SAY:**
To test how different surfaces affect friction, we first need to build our model cars!
Choose one GoldieBlox Parade Float to build in pairs for your model car. If you don’t like any of the designs, feel free to build your own!

Have Daisies choose one of the floats from the end of “Goldie Blox and the Parade Float” or GoldieBlox Parade Floats handout to build in pairs:

- Katinka’s Parade Float
- The Whirly Mobile
- Nacho’s Swing Wheeler
- A simple rectangle with one wheel in front and one behind (four short axles, four blox, two wheels)

(Note to Volunteers: You may want to save the Daisies’ model cars for the next meeting, Model Car Design Challenge 2. If you are able to, label each car with the girl or group’s name(s) and put away until the next meeting. If you are unable to keep them together, don’t worry, the girls will have a chance to rebuild at the start of the next meeting.)

Activity 4: Use Model Cars to Test the Friction of Different Surfaces

Time Allotment
15 Minutes

Materials
- Floats created in Activity 3: Design and Build Model Cars
- 2+ friction stations for girls to test their cars (including a different surface at each station). See Prepare Ahead for more information on how to create the stations.
- Optional: Yard sticks, rulers, or string for Daisies to measure how far their cars go at each station.
- Optional: Paper and pencils if Daisies can read/write to record data.

Steps

Set Up. (5 minutes)
Prior to the meeting, prepare 2 or more friction stations. See Prepare Ahead for more information.

Before Daisies test their cars, help the girls design an investigation to help them complete Step Two of the Model Car Design Challenge.
SAY:
When engineers build something new, they test it to see if there are ways to improve their design.

How could we test which surface is best for cars? (Answer: Roll a car across different surfaces.)

How could we make sure the test is fair?

Girls may say: Test all cars on the same surface. Use the same force on each car on each surface. Use the same car on each surface.

How can we measure how far the cars go?

Girls may say: Eyeball it. Use a yard stick, tape measure or string. Count floor tiles.

How can we sure our results are right?

Girls may say: Do the test more than once.

This is a great plan for testing your cars on different surfaces.

Now you’re going to put your plan into action and test your cars, just like engineers.

Test your car. (10 minutes)

Divide the girls into pairs (most likely the same teams they built their cars in).

Tell Daisies to take turns testing their cars at the different Friction Stations around the room.

SAY:
Test your car by letting it roll down the ramp and onto a surface.

Do this three times for each surface.

Be sure to remember which surface was easier for your car to move on and at which station your car went the farthest.

Engineers do testing, just like this, to design cars that are both fast and safe!
Optional: If Daisies can read, write, and measure, hand out paper, pencils, and yardsticks (or other measurement tools) to measure how far their cars go at each station and record their results.

Daisies test their cars on each surface.

Activity 5: Closing Ceremony: Reviewing Our Testing Results

Time Allotment
10 Minutes

Materials
• None

Steps

Have Daisies form a Friendship Circle and discuss their test results.

SAY:
Do you see a pattern in our results? (Answer: Most cars should have traveled the farthest at the same station—the one with the smoothest surface.)

Which cars traveled farthest? Why do you think that is? (Answer: The smallest cars should have gone the farthest. This is because it was lighter, so the rough surface affected it less.)

Why do you think the cars traveled farthest there?

Is that what you thought would happen?

Did the car eventually stop on the smoothest surface? Why?

What sorts of surfaces are the slipperiest? How could make them even more slippery? What would happen if we put oil on everything? (Answer: The car would go farther but still stop.)

Why? (Answer: On Earth, there is always some friction, even if it’s only air resistance.)
Can you think of an example when friction makes it hard to slide something heavy? (Example: Trying to slide furniture across a carpet.)

End the meeting with a Friendship Squeeze.

All GoldieBlox products, characters, illustrations, text, copyrights, and trademarks are the sole property of GoldieBlox, Inc.
Design Challenge Badges
Glossary for Daisies

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

**Inventors** are people who think of and build new products and ideas.

**Engineers** are people who like to know how things work. They design and build things people use every day, like computers, phones, roads, bridges and cars.

**Brainstorming** is what happens when you and your troop get together to come up with ideas.

**Features** are parts of a product that are designed make them more useful.

**Force** is the strength or energy that creates movement. Push and pull are examples of force.

**Friction** is a force that slows moving objects.
Daisy Design Challenge Badges: Materials List

Board Game Design Challenge 1

Activity 1: As Girls Arrive: Paper Games
- Paper
- Pencils
- Optional: Find and print out puzzles, mazes and other simple paper games

Activity 2: Opening Ceremony: All About Games
- Flag
- Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Come Up with an Idea for Your Board Game
- Paper
- Markers and/or crayons

Activity 4: Design a Spinner for Your Game
- GoldieBlox Making Things Move kit (one set for each pair or small team.) Feel free to add additional pieces from personal GoldieBlox kits that you or your Girl Scouts may own.

Activity 5: Closing Ceremony
- Spinner Paper Pieces (one for each Spinner created)

Board Game Design Challenge 2

Activity 1: As Girls Arrive: Create Your Game Board
- Spinners created in Board Game Design Challenge 1. (Note to Volunteers: If you were unable to save the spinner between meetings, Daisies can rebuild their spinners during this activity.)
- **Spinner Paper Pieces** (one for each Spinner created)
- Large paper, construction paper, or poster board
- Markers and/or crayons

Activity 2: Opening Ceremony: Share Your Game Board
- Flag
- Spinners and game boards created by Daisies
- Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Test Your Game and Make It Better
- Spinners and game boards created by Daisies
- GoldieBlox Making Things Move kit (one set for each pair or small team)

Activity 4: Closing Ceremony: Awards
- Board Game Design Challenge award

(Note to Volunteers: You can buy these awards from your council shop or on the Girl Scouts' website.)
Daisy Design Challenge Badges: Materials List

Roller Coaster Design Challenge 1

Activity 2: Opening Ceremony: All About Roller Coasters
• Flag
• Where Does the Roller Coaster Go Fastest? handout
• Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Make a Simple Roller Coaster Car
• GoldieBlox Making Things Move kit (one set for each pair or small team.) (Note to Volunteers: A simple roller coaster car uses 2 wheels, 4 blocks, and 4 short axles, but girls can build upon this with the other pieces. Feel free to add additional pieces from personal GoldieBlox kits that you or your Girl Scouts may own.)
• Simple Roller Coaster Car handout

Activity 4: Build a Model of a Roller Coaster
• Roller coaster cars created by girls in Activity 3: Make a simple roller coaster car
• Folders, poster boards, cardboard, etc., to lean against something to create a ramp
• Books, boxes, tables, etc. to create the height and top of a ramp

Roller Coaster Design Challenge 2

Activity 1: As Girls Arrive: Prepare for Testing
• Roller coaster cars created by girls in Roller Coaster Design Challenge 1. (Note to Volunteers: If you were unable to save the roller coaster cars between meetings, Daisies can rebuild their cars during this activity.)
• Folders, poster boards, cardboard, etc., to lean against something to create a ramp
• Books, boxes, tables, etc. to create the height and top of a ramp

Activity 2: Opening Ceremony: Engineers Work Together!
• Flag
• Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Test Your Roller Coaster
• Roller coaster cars created by girls in Roller Coaster Design Challenge 1 or rebuilt in Activity 1: As Girls Arrive: Prepare for Testing
• Ramps created in Activity 1: As Girls Arrive: Prepare for Testing
• Leftover materials from Activity 1: As Girls Arrive: Prepare for Testing for girls to build on ramps
• Leftover parts from the GoldieBlox Making Things Move kit for girls to build on their roller coaster cars

Activity 4: Closing Ceremony: Awards
• Roller Coaster Design Challenge award

(Note to Volunteers: You can buy these awards from your council shop or on the Girl Scouts’ website.)
Daisy Design Challenge Badges: Materials List

Model Car Design Challenge 1

Activity 1: As Girls Arrive: Playing with Force and Friction
• Sports and game balls (one for each pair of girls). Bring different types of balls for girls to roll and observe friction. For example, you might bring a marble, tennis ball, basketball, ping pong ball, baseball, etc.
• Create two lines with masking tape on the floor. Each Daisy should sit on the line, facing their partner.

Activity 2: Opening Ceremony: All About Friction
• Flag
• Optional: Poster Board with the Girl Scout Promise and Law
• Optional: Print out pictures of a bicycle wheel (including brake pads), a golf ball on a putting green, a baseball player sliding, and a sled loaded with supplies (or other examples of friction)

Activity 3: Design and Build Model Cars
• GoldieBlox Making Things Move kit (one set for each pair or small team.) (Note to Volunteers: Depending on what model car Daisies decide to build, pieces will vary. Feel free to add additional pieces from personal Goldieblox kits that you or your Girl Scouts may own.)
• “GoldieBlox and the Parade Float” or GoldieBlox Parade Floats handout

Activity 4: Use Model Cars to Test the Friction of Different Surfaces
• Floats created in Activity 3: Design and Build Model Cars
• 2+ Friction stations for girls to test their cars (including a different surface at each station). See Prepare Ahead for more information on how to create the stations.
• Optional: Yard sticks, rulers, or string for Daisies to measure how far their cars go at each station.
• Optional: Paper and pencils if Daisies can read/write to record data.

Model Car Design Challenge 2

Activity 1: As Girls Arrive: Build a Simple Ramp
• Model cars created by girls in Model Car Design Challenge 1. (Note to Volunteers: If you were unable to save the model cars between meetings, Daisies can rebuild their cars during this activity.)
• Folders, poster boards, cardboard, etc., to lean against something to create a ramp
• Books, boxes, tables, etc. to create the height and top of a ramp

Activity 2: Opening Ceremony: Reviewing Force and Friction
• Flag
• Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Race Your Cars!
• Model cars created by girls in Model Car Design Challenge 1 or rebuilt in Activity 1: As Girls Arrive: Build a Simple Ramp
• Sample ramp or ramps created in Activity 1: As Girls Arrive: Build a Simple Ramp
• Leftover parts from the GoldieBlox Making Things Move kit for girls to rebuild their model cars
• Surface for bottom of ramp (towel, carpet, or asphalt)
Model Car Design Challenge 2 (continued)

Activity 4: Closing Ceremony: Awards

• Model Car Design Challenge 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.
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.
BLUEPRINT
Parade Float Base

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

All GoldieBlox products, characters, illustrations, text, copyrights, and trademarks are the sole property of GoldieBlox, Inc.
Nacho’s Swing Wheeler

5 wheels
6 blocks
4 long axles
7 short axles

Goldie’s Ribbon Roller

5 wheels
4 blocks
2 long axles
6 short axles
1 ribbon
The Double Slide Wagon

- 7 wheels
- 6 blocks
- 4 long axles
- 9 short axles
- 2 spacers
- 1 ribbon

Space-r-Launcher

- 3 wheels
- 6 blocks
- 4 long axles
- 6 short axles
- 1 ribbon
- spacers
Katinka’s Parade Float

7 wheels
6 blocks
4 long axles
9 short axles
4 spacers
1 ribbon

The Whirly Mobile

7 wheels
3 blocks
2 long axles
7 short axles
4 spacers
Model Car Design Challenge 2

Overview

In the Model Car Design Challenge, Daisies learn about engineering and friction by building and testing a Model Car. Daisies learn how to design and test new things they invent.

Step One: Design and build model cars (Completed in Model Car Design Challenge 1)
Step Two: Use model cars to test the friction of different surfaces (Completed in Model Car Design Challenge 1)
Step Three: Race your cars!

This meeting, Daisies use what they have learned to improve their cars, create a track, and race them in a competition. Daisies complete Step Three of the Challenge, earning the Model Car Design Challenge badge.

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.

This badge requires the GoldieBlox Making Things Move kit. Each kit includes 6 sets of GoldieBlox parts for the badge, (i.e. you can create 6 of any Daisy Design Challenge badge from one kit). Inside the kit are six sets of GoldieBlox parts that allow girls to earn all 3 Daisy Design Challengesbadges. Two to four girls can use each set. So if you have 12 girls, buy one kit per them to work in pairs. You can purchase the kit online from the Girl Scout Shop: http://www.girlscoutshop.com/

You will not be able to buy the correct kit from the GoldieBlox website or your council shop.

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.

**Fail Fast. Succeed Sooner:** That’s how engineers solve problems. In this badge, Daisies will learn about engineering 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 Daisies think this way. When her 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 Daisies are free to invent things without feeling the pressure to make them perfect.

**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 build a board game or to make a car speed down a ramp. 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 Daisies 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 Daisies 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 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)

PLEASE NOTE: You will need the GoldieBlox Making Things Move kit for girls to complete the requirements and earn the badges. Details for the kit are listed in this section and on the Materials List.

1. Review vocabulary (2 minutes)

This meeting includes the following vocabulary:

- **Friction** – a force that slows moving objects.
- **Force** – the strength or energy that creates movement. Push and pull are examples of force.

See the Glossary for Daisy Design Challenge Badges 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 Design Challenge 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.

- **Glossary for Daisy Design Challenge Badges**: 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.

4. 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.

(Note to Volunteers: You will need the GoldieBlox Making Things Move kit for the girls to complete the requirements and earn the badges. You can purchase this from the Girl Scouts Shop: http://www.girlscoutshop.com/.)

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.
- Assist with Design Challenge activities.

Award Connection

Daisies will earn one award:
- Model Car Design Challenge badge

Daisies receive the award following the completion of all three steps of the badge 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.
Model Car Design Challenge 2

In the Model Car Design Challenge, Daisies learn about engineering and friction by building and testing a Model Car. Daisies learn how to design and test new things they invent.

**Step One:** Design and build model cars (Completed in Model Car Design Challenge 1)

**Step Two:** Use model cars to test the friction of different surfaces (Completed in Model Car Design Challenge 1)

**Step Three:** Race your cars!

This meeting, Daisies use what they have learned to improve their cars, create a track, and race them in a competition. Daisies complete Step Three of the Challenge, earning the Model Car Design Challenge badge.

**Materials List**

**Activity 1: As Girls Arrive: Build A Simple Ramp**
- Model cars created by girls in Model Car Design Challenge 1. (**Note to Volunteers:** If you were unable to save the model cars between meetings, Daisies can rebuild their cars during this activity.)
- Folders, poster boards, cardboard, etc., to lean against something to create a ramp
- Books, boxes, tables, etc. to create the height and top of a ramp

**Activity 2: Opening Ceremony: Reviewing Force and Friction**
- Flag
- Optional: Poster Board with the Girl Scout Promise and Law

**Activity 3: Race Your Cars!**
- Model cars created by girls in Model Car Design Challenge 1 or rebuilt in Activity 1: As Girls Arrive: Build a Simple Ramp
- Sample ramp or ramps created in Activity 1: As Girls Arrive: Build a Simple Ramp
- Leftover parts from the GoldieBlox Making Things Move kit for girls to rebuild their model cars
- Surface for bottom of ramp (towel, carpet, or asphalt)

**Activity 4: Closing Ceremony: Awards**
- Model Car Design Challenge award

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

© 2017 GSUSA. All rights reserved. Not for commercial use. This Material is proprietary to GSUSA and may be used, reproduced and distributed exclusively by GSUSA staff, councils, Girl Scout volunteers, service units and/or troops solely in connection with Girl Scouting.

We are pleased to provide these materials solely to our staff, councils, Girl Scout volunteers, service units and/or troops to use in connection with Girl Scouting. These materials are protected under copyright law and we appreciate your compliance in not reproducing and/or redistributing these materials without our written permission. If you have any doubts as to whether your proposed use violates our copyright law rights, please email us at permissions@girlscouts.org with your question.
Detailed Activity Plan

Activity 1: As Girls Arrive: Build a Simple Ramp

Time Allotment
10 Minutes

Materials
- Model cars created by girls in Model Car Design Challenge 1. (Note to Volunteers: If you were unable to save the model cars between meetings, Daisies can rebuild their cars during this activity.)
- Folders, poster boards, cardboard, etc., to lean against something to create a ramp
- Books, boxes, tables, etc. to create the height and top of a ramp
- Prepare a sample ramp to show Daisies.

Steps
Prior to the meeting, create a sample ramp for Daisies. You may make a simple ramp by placing strips of cardboard or folders on textbooks.

As Daisies arrive, welcome them, and have them work in pairs or small teams to build a simple ramp to start testing their cars.

Optional: If you were unable to save the model cars between meetings, Daisies can rebuild them.

SAY:
Today, you’re going to redesign and race your model cars.

Looking at my ramp, do you think you could create one for your car?

Once you create it, see how your model car rolls down.

Have Daisies create simple ramps and begin to test their model cars.

If there’s time, encourage Daisies to redesign their ramps to see how it affects their car’s speed.

SAY:
What happens if you change the height your ramp? Does it affect how fast your car rolls down the ramp?

Lead them to discover that the height/incline of the ramp affects the speed of the car as it goes down, i.e. it goes slower when there is less slope, and faster when there is more incline.

Activity 2: Opening Ceremony: Reviewing Force and Friction

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 force and friction with Daisies, and explain today’s engineering challenge to Daisies.

SAY:
Does anyone remember what force is? What’s friction? (Answer: Force is the strength or energy that creates movement. Friction is a force that slows moving objects.)

What did you learn about force and friction from testing your cars last time?

Girls may say: Friction affects how fast it goes, the size of the car affects its speed, etc.

Last time, you built your model car. You learned about force, friction, and how the size and weight of a car can affect its speed. You even tested your cars on different surfaces to see how different surfaces affect the amount of friction.

Today, you’ll have the chance to use all you’ve learned to redesign your car before we have a Troop Car Chase to see whose car goes the furthest!
Activity 3: Race Your Cars!

Time Allotment
30 Minutes

Materials
- Model cars created by girls in Model Car Design Challenge 1 or rebuilt in Activity 1: As Girls Arrive: Build a Simple Ramp
- Sample ramp or ramps created in Activity 1: As Girls Arrive: Build a Simple Ramp
- Leftover parts from the GoldieBlox Making Things Move kit for girls to rebuild their model cars
- Surface for bottom of ramp (towel, carpet, or asphalt)

Steps

Set Up. (5 minutes)
Set your sample ramp or one of the Daisies’ ramp on or next to the surface. This will be the race track for the Troop Car Chase.

Divide Daisies back into their pairs (or new pairs) to redesign and improve their car's build before taking part in a Troop Car Chase for Step Three of the Model Car Design Challenge.

SAY:
Now, you'll have ten minutes to pair up and draw a plan for a car that will (1) carry the characters and (2) roll the farthest when placed at the top of a ramp on the roughest surface (towel, carpet, or asphalt depending on your setup).

Remember to think about all the things you learned last time that can make this car even better than before.

Design and build. (10 minutes)
Give girls ten minutes to build and test their cars on the Troop Car Chase racetrack.

If you were able to save the girls’ cars from Model Car Design Challenge 1, Daisies can choose to build off of their old cars or create brand new ones. If you weren’t able to save them from the last meeting, don’t worry, just have girls create brand new cars!

Race your new cars. (15 minutes)
Hold a Troop Car Chase using the new cars and racetrack.
Allow the first pair to test their car and leave it where it stops.

Place the next car at the top of the ramp, and watch to see if it either bumps or passes the previous car. If so, it now stays on the track as the record-holder. Whichever car is still on the track after testing them all is the winner.

SAY:
You all did a great job coming up with new car designs, just like engineers.

It’s okay if your car didn’t go the farthest today. Sometimes engineers have to test their designs many times before they come up with the best way to do something.

Activity 4: Closing Ceremony: Awards

Time Allotment
10 Minutes

Materials
- Model Car Design Challenge 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 and wrap up the Model Car Design Challenge before they receive their awards.

SAY:
How did you improve your car today? What did you do to make it better than your first design?

If you could rebuild your car one more time, what would you change?

You were engineers today. How did that feel?

Let’s go around the circle. Each of you can tell a little story about what you learned.

Keep It Girl-Led: Let girls answer. Make sure every girl gets a chance to speak.
Daisies earn the Model Car Design Challenge badge.

**SAY:**
You’ve now earned the Model Car Design Challenge 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 your Model Car Design Challenge award, which means you have learned about friction by building and testing model cars. You now know how to design and test new things that you invent.

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.

All GoldieBlox products, characters, illustrations, text, copyrights, and trademarks are the sole property of GoldieBlox, Inc.

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

- Telling other people what I learned about force, friction, and fair tests.
Design Challenge Badges
Glossary for Daisies

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

**Inventors** are people who think of and build new products and ideas.

**Engineers** are people who like to know how things work. They design and build things people use every day, like computers, phones, roads, bridges and cars.

**Brainstorming** is what happens when you and your troop get together to come up with ideas.

**Features** are parts of a product that are designed to make them more useful.

**Force** is the strength or energy that creates movement. Push and pull are examples of force.

**Friction** is a force that slows moving objects.
Daisy Design Challenge Badges: Materials List

**Board Game Design Challenge 1**

**Activity 1: As Girls Arrive: Paper Games**
- Paper
- Pencils
- Optional: Find and print out puzzles, mazes and other simple paper games

**Activity 2: Opening Ceremony: All About Games**
- Flag
- Optional: Poster Board with the Girl Scout Promise and Law

**Activity 3: Come Up with an Idea for Your Board Game**
- Paper
- Markers and/or crayons

**Activity 4: Design a Spinner for Your Game**
- GoldieBlox Making Things Move kit (one set for each pair or small team.) Feel free to add additional pieces from personal GoldieBlox kits that you or your Girl Scouts may own.

**Activity 5: Closing Ceremony**
- Spinner Paper Pieces (one for each Spinner created)

**Board Game Design Challenge 2**

**Activity 1: As Girls Arrive: Create Your Game Board**
- Spinners created in Board Game Design Challenge 1. *(Note to Volunteers: If you were unable to save the spinner between meetings, Daisies can rebuild their spinners during this activity.)*
- **Spinner Paper Pieces** (one for each Spinner created)
- Large paper, construction paper, or poster board
- Markers and/or crayons

**Activity 2: Opening Ceremony: Share Your Game Board**
- Flag
- Spinners and game boards created by Daisies
- Optional: Poster Board with the Girl Scout Promise and Law

**Activity 3: Test Your Game and Make It Better**
- Spinners and game boards created by Daisies
- GoldieBlox Making Things Move kit (one set for each pair or small team)

**Activity 4: Closing Ceremony: Awards**
- Board Game Design Challenge award

*(Note to Volunteers: You can buy these awards from your council shop or on the Girl Scouts’ website.)*
Daisy Design Challenge Badges: Materials List

Roller Coaster Design Challenge 1

Activity 2: Opening Ceremony: All About Roller Coasters
- Flag
- Where Does the Roller Coaster Go Fastest? handout
- Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Make a Simple Roller Coaster Car
- GoldieBlox Making Things Move kit (one set for each pair or small team.) (Note to Volunteers: A simple roller coaster car uses 2 wheels, 4 blocks, and 4 short axles, but girls can build upon this with the other pieces. Feel free to add additional pieces from personal GoldieBlox kits that you or your Girl Scouts may own.)
- Simple Roller Coaster Car handout

Activity 4: Build a Model of a Roller Coaster
- Roller coaster cars created by girls in Activity 3: Make a simple roller coaster car
- Folders, poster boards, cardboard, etc., to lean against something to create a ramp
- Books, boxes, tables, etc. to create the height and top of a ramp

Roller Coaster Design Challenge 2

Activity 1: As Girls Arrive: Prepare for Testing
- Roller coaster cars created by girls in Roller Coaster Design Challenge 1. (Note to Volunteers: If you were unable to save the roller coaster cars between meetings, Daisies can rebuild their cars during this activity.)
- Folders, poster boards, cardboard, etc., to lean against something to create a ramp
- Books, boxes, tables, etc. to create the height and top of a ramp

Activity 2: Opening Ceremony: Engineers Work Together!
- Flag
- Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Test Your Roller Coaster
- Roller coaster cars created by girls in Roller Coaster Design Challenge 1 or rebuilt in Activity 1: As Girls Arrive: Prepare for Testing
- Ramps created in Activity 1: As Girls Arrive: Prepare for Testing
- Leftover materials from Activity 1: As Girls Arrive: Prepare for Testing for girls to build on ramps
- Leftover parts from the GoldieBlox Making Things Move kit for girls to build on their roller coaster cars

Activity 4: Closing Ceremony: Awards
- Roller Coaster Design Challenge award

(Note to Volunteers: You can buy these awards from your council shop or on the Girl Scouts' website.)
Daisy Design Challenge Badges: Materials List

Model Car Design Challenge 1

Activity 1: As Girls Arrive: Playing with Force and Friction
- Sports and game balls (one for each pair of girls). Bring different types of balls for girls to roll and observe friction. For example, you might bring a marble, tennis ball, basketball, ping pong ball, baseball, etc.
- Create two lines with masking tape on the floor. Each Daisy should sit on the line, facing their partner.

Activity 2: Opening Ceremony: All About Friction
- Flag
- Optional: Poster Board with the Girl Scout Promise and Law
- Optional: Print out pictures of a bicycle wheel (including brake pads), a golf ball on a putting green, a baseball player sliding, and a sled loaded with supplies (or other examples of friction)

Activity 3: Design and Build Model Cars
- GoldieBlox Making Things Move kit (one set for each pair or small team.) (Note to Volunteers: Depending on what model car Daisies decide to build, pieces will vary. Feel free to add additional pieces from personal Goldieblox kits that you or your Girl Scouts may own.)
- “GoldieBlox and the Parade Float” or GoldieBlox Parade Floats handout

Activity 4: Use Model Cars to Test the Friction of Different Surfaces
- Floats created in Activity 3: Design and Build Model Cars
- 2+ Friction stations for girls to test their cars (including a different surface at each station). See Prepare Ahead for more information on how to create the stations.
- Optional: Yard sticks, rulers, or string for Daisies to measure how far their cars go at each station.
- Optional: Paper and pencils if Daisies can read/write to record data.

Model Car Design Challenge 2

Activity 1: As Girls Arrive: Build a Simple Ramp
- Model cars created by girls in Model Car Design Challenge 1. (Note to Volunteers: If you were unable to save the model cars between meetings, Daisies can rebuild their cars during this activity.)
- Folders, poster boards, cardboard, etc., to lean against something to create a ramp
- Books, boxes, tables, etc. to create the height and top of a ramp

Activity 2: Opening Ceremony: Reviewing Force and Friction
- Flag
- Optional: Poster Board with the Girl Scout Promise and Law

Activity 3: Race Your Cars!
- Model cars created by girls in Model Car Design Challenge 1 or rebuilt in Activity 1: As Girls Arrive: Build a Simple Ramp
- Sample ramp or ramps created in Activity 1: As Girls Arrive: Build a Simple Ramp
- Leftover parts from the GoldieBlox Making Things Move kit for girls to rebuild their model cars
- Surface for bottom of ramp (towel, carpet, or asphalt)
Daisy Design Challenge Badges: Materials List

Model Car Design Challenge 2 (continued)

Activity 4: Closing Ceremony: Awards
  • Model Car Design Challenge 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.
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.
Model Car Design Challenge badge

Bill of Materials

- x 4
- x 2
- x 6
- x 4
- x 4

All GoldieBlox products, characters, illustrations, text, copyrights, and trademarks are the sole property of GoldieBlox, Inc.
BLUEPRINT

Parade Float Base

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

All GoldieBlox products, characters, illustrations, text, copyrights, and trademarks are the sole property of GoldieBlox, Inc.
Nacho’s Swing Wheeler

5 wheels
6 blocks
4 long axles
7 short axles

Goldie’s Ribbon Roller

5 wheels
4 blocks
2 long axles
6 short axles
1 ribbon
1 ribbon
The Double Slide Wagon

- 7 wheels
- 6 blocks
- 4 long axles
- 9 short axles
- 2 spacers
- 1 ribbon

3 wheels
6 blocks
4 long axles
6 short axles
1 ribbon
spacers

Space-r-Launcher
Katinka’s Parade Float

7 wheels
6 blocks
4 long axles
9 short axles
4 spacers
1 ribbon

The Whirly Mobile

7 wheels
3 blocks
2 long axles
7 short axles
4 spacers

All GoldieBlox products, characters, illustrations, text, copyrights, and trademarks are the sole property of GoldieBlox, Inc.