FIRST LEGO LEAGUE CHALLENGE

TEAM MEETING GUIDE

SUPERPOWERED
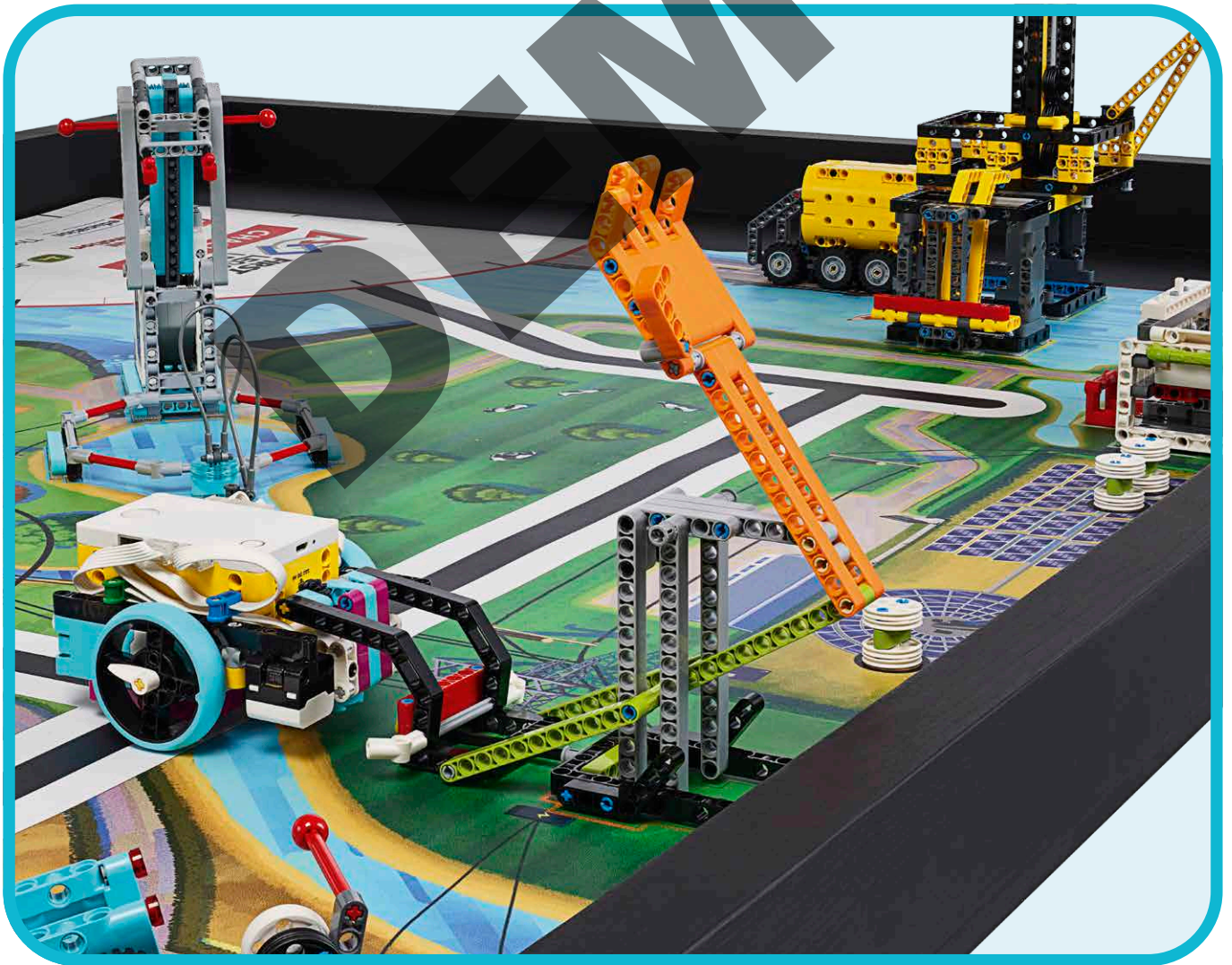
FIRST

LEGO education

Introduction to *FIRST*® LEGO® League Challenge

Friendly competition is at the heart of *FIRST*® LEGO® League Challenge, as teams of up to 10 children engage in research, problem-solving, coding, and engineering as they build and code a LEGO® robot that navigates the missions of the Robot Game. Teams also participate in an Innovation Project to identify and solve a relevant real-world problem.

FIRST LEGO League Challenge is one of three divisions by age group of the *FIRST* LEGO League program. This program inspires young people to experiment and grow their confidence, critical thinking, and design skills through hands-on learning. *FIRST* LEGO League was created through an alliance between *FIRST*® and LEGO® Education.

## *FIRST*® ENERGIZE℠ Presented by Qualcomm and SUPERPOWERED℠

Welcome to the *FIRST*® ENERGIZE℠ season presented by Qualcomm. This year's *FIRST* LEGO League challenge is called SUPERPOWERED℠. Children will learn about how energy is generated, stored, distributed, and consumed. As there are more demands for energy, the children need to rethink how energy is generated and used. We have the power to build a path forward and invent the future of energy. And it starts here, with you.
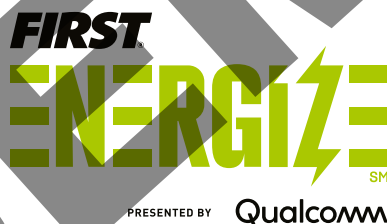
Program Outcomes

The team will:
- Use and apply the *FIRST* Core Values and engineering design process to develop robot and Innovation Project solutions.
- Identify and research a problem related to the season theme and then design and create an Innovation Project solution.
- Identify a mission strategy and design, create, and code a robot to complete missions.
- Test, iterate, and improve their Robot Design and Innovation Project.
- Communicate their Robot Design and Innovation Project and demonstrate their robot in the Robot Game.
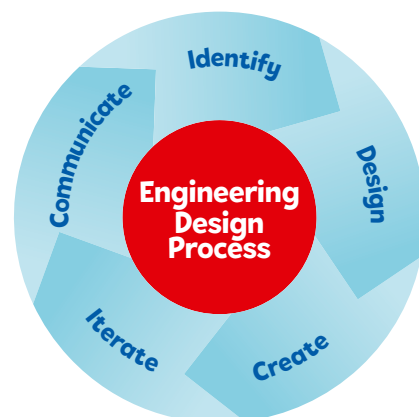
Overview

How to Use This Guide

The sessions provide a guided experience for the *FIRST*® LEGO® League Challenge. The sessions are designed to be flexible so that teams of varying experiences can use the materials. Your role is to facilitate and guide the team during the sessions to complete the team tasks. The tips within this guide are just suggestions. Remember to do whatever is best for you and your implementation.

FIRST® Core Values

The *FIRST*® Core Values are the cornerstones of the program. *Gracious Professionalism*® is a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community. The team's Core Values and *Gracious Professionalism* are evaluated during Robot Game matches and during the judging session at the tournament. The team demonstrates *Coopertition*® by showing that learning is more important than winning and that they can help others even as they compete.
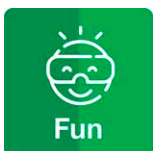
Teamwork — We are stronger when we work together.

Inclusion — We respect each other and embrace our differences.

Impact — We apply what we learn to improve our world.

Fun — We enjoy and celebrate what we do!

Discovery — We explore new skills and ideas.

Innovation — We use creativity and persistence to solve problems.

What Does the Team Need?

LEGO® Education SPIKE™ Prime Set

Core set

Expansion set

Note: *Other LEGO® Education sets such as MINDSTORMS® and Robot Inventor are also allowed.*

Electronic Devices

Each team will need two compatible devices such as a laptop, tablet, or computer. Prior to starting Session 1, you need to download the appropriate software (LEGO® Education SPIKE™ Prime or other compatible software) on to the device.

SUPERPOWERED℠ Challenge Set

This challenge set comes in a box that contains the mission models, challenge mat, and some miscellaneous pieces. The team should build the models very carefully using the building instructions. The miscellaneous items include 3M™ Dual Lock™ Reclosable Fasteners, coach pins, and season tiles for the team members.

Mission Model Building Instructions

Challenge Mat and Table

Set up a table with the challenge mat in your classroom or meeting space. Even if you cannot build the whole table, building just the four walls will be useful. It is also possible to use the mat on the floor.

Session Layout

Every session starts with an introduction and ends with a Share activity. Details for these activities are given in the session pages that follow, along with notes and tips to help you run the session.

	Introduction (10-15 minutes)	Team Tasks (100-120 minutes)		Share (10-15 minutes)
Session 1 White Energy Journey	Introduction to Challenge	Getting Started Robot Lessons	White Energy Journey	Share
Session 2 Blue Energy Journey	Goals and Processes	Training Camp 1: Driving Around	Blue Energy Journey	Share
Session 3 Yellow Energy Journey	Team Design	Training Camp 2: Playing with Objects	Yellow Energy Journey	Share
Session 4 Orange Energy Journey	Discovery Examples	Training Camp 3: Reacting to Lines	Orange Energy Journey	Share
Session 5 Investigate Ideas	Teamwork Examples	Guided Mission	Identify Project	Share
Session 6 Identify Solutions	Innovation Project Build	Pseudocode and Mission Strategy	Plan Innovation Project Solution	Share
Session 7 Create Solutions	*Gracious Professionalism*® Examples	Solve Missions	Develop Project Solution	Share
Session 8 Continue Creating	*Coopertition*® Examples	Solve Missions	Evaluate and Test Project Solution	Share
Session 9 Solution Planning	Innovation Examples	Iterate and Improve Robot Solution	Iterate and Improve Project Solution	Share
Session 10 Iterate Solutions	Impact Examples	Iterate and Improve Robot Solution	Plan Project Presentation	Share
Session 11 Presentation Planning	Inclusion Examples	Plan Robot Design Explanation	Practice Project Presentation	Share
Session 12 Communicate Solutions	Fun Examples	Practice Robot Game Matches	Practice Full Presentation	Share

Outcomes

The team will:
- Learn how to connect and use the sensors and motors.
- Make connections from the mission models to the White Energy Journey Project Spark ideas.

Estimated times are provided for each part of the session.

1 Have the team watch the season videos on the *FIRST*® LEGO® League YouTube channel and read pages 3-9 in their *Engineering Notebooks*.

2 Two devices are suggested, one for the robot and one for project work. Additional devices for the mission model building are useful.

3 Activities in the sessions use the LEGO Education SPIKE™ Prime app.

4 Make sure the controller and device are plugged in and charging at the end of the session.

5 Robot Game Connection: Have the team think about how a sensor could be helpful to get the robot to stop in the right place to engage with a mission model on the mat.

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1 → **Introduction**
(10-15 minutes)

☐ Watch the season videos and read pages 3-9 on how *FIRST*® LEGO® League Challenge works and the SUPERPOWERED℠ challenge.

2 → **Tasks**
(50-60 minutes)

☐ Open the SPIKE™ Prime app. Find your lesson.

3 **Getting Started Activities: 1-6**

4 ☐ Identify the missions that could be solved with the coding skills learned in this lesson.

☐ Check out the *Robot Game Rulebook* for mission details.

☐ Try it out! See if you can use the skills you learned to complete a mission.

5

→ **Reflection Questions**
- How could stopping a motor help you solve a mission with your robot?
- What do you know about energy? What are resources that can help you learn more?

Session 1

What are the four parts of *FIRST* LEGO League Challenge?

Every session has an Introduction prompt and space to document the team's responses.

Our Notes:

Open space is provided in the *Engineering Notebook* each session for the team to collaboratively capture their thoughts, ideas, diagrams, and notes.

Some sessions will have helpful tips for the team.

The *Robot Game Rulebook* is a great resource to use throughout the sessions.

Session 2

Outcomes

The team will:
- Build a driving base and code it to move forward, move backward, and turn.
- Make connections from the mission models to the Blue Energy Journey Project Spark ideas.

1 Example prompts for goal setting are provided in the *Engineering Notebook*.

2 Remind the team back up saved program files.

3 After a program is downloaded onto the controller, it cannot be transferred back to be opened and edited.

4 Have the team practice their new skills by trying to drive the robot to a model and then returning to home.

5 Robot Game Connection: Have the team code the robot to push an object and deliver it to a target area on the mat.

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1 → **Introduction**
(10-15 minutes)

☐ Think about some goals you want to achieve. These can grow and change throughout your journey.

☐ Use the engineering design process and try out using team roles listed on page 8 in this session.

→ **Tasks**
(50-60 minutes)

2 ☐ Open the SPIKE™ Prime app. Find your lesson.

Competition Ready Unit: Training Camp 1: Driving Around

3 ☐ Determine what coding and building skills you can apply in the Robot Game.

4 ☐ Try it out! See if you can use the skills you learned to drive your robot to one of the mission models.

5

→ **Reflection Questions**
- How can you aim your robot toward a model?
- How did you use the engineering design process and team roles in this session?

Session 2

My Personal Goals:

Our Notes:

Use these goal prompts for inspiration!

We will use Core Values to . . .
We want to experience . . .
We want our robot to . . .
We want our Innovation Project to . . .

Checkpoint 1

0 ———————— **1** ———————— **2** ———————— **3**

- [ ] The team has bonded and are working well together. If they need more support to achieve this, do some extra team-building activities.

- [ ] New teams may want to summarize the new robot skills they have learned.

- [ ] All models must be built and placed on the mat and secured with the Dual Lock squares as needed.

- [ ] Extra time can be spent on the robot lessons before moving on.

- [ ] Have students reflect on their goals and adjust them based on information they have learned in the first four sessions.

- [ ] The team has explored and designed solutions for all the Project Sparks.

- [ ] The team has reviewed the missions and rules in the *Robot Game Rulebook*.

- [ ] The team could complete the exploration activity listed in the Career Connections pages in the *Engineering Notebook* after Session 4.

- [ ] Check in with the team on their progress on their personal and team goals.

Sessions 5-8 Tips

CORE VALUES

Remember that the Core Values are about HOW the team behaves and works together. They should be demonstrated by all team members all the time.

ROBOT DESIGN

At the Robot Game matches, two Robot Game tables will be set up next to each other. However, during the sessions, you can work with a single Robot Game table.

INNOVATION PROJECT

The team will have to select a final problem and solution to focus on, so thinking about this goal during each session is helpful.

ROBOT GAME

Look for missions that:
- Use basic robot skills like push, pull, or lift.
- Have models close to a launch area.
- Involve navigation with line following.
- Have easy access to home.

Understanding the Rubrics

Core Values and *Gracious Professionalism*®

Teams express the six Core Values through the way they behave with each other and with people outside the team on their learning journey. In *FIRST*® LEGO® League Challenge, this is called *Gracious Professionalism*®.

Teams will have their *Gracious Professionalism* evaluated at every Robot Game match. Remember, if they cannot attend a match, they should let the referee know.

Innovation Project and Robot Design

The rubrics used to evaluate the teams in these areas are based on the engineering design process. The team works on their project and robot and solves problems using this process. Team members need to demonstrate and explain everything they have done during the judging session.

Note: Class Packs may use the Class Pack Rubric instead of these team rubrics.

Download Rubrics

Final Checkpoint

Prepare for Your Tournament!

- [ ] The main goal of an event is for the team to have FUN and to feel that their work is valued.

- [ ] Remind the team that the event is also a learning experience and the goal is not to be an expert when they arrive.

- [ ] Encourage the team to engage with other teams to share what they have learned and to support each other.

- [ ] Check over the details and requirements for the tournament you are attending. They can vary depending on the type you plan to attend.

- [ ] Review the time and location where you are meeting for the event and how long the team is expected to stay – share this with parents. Encourage families to attend if this is possible.

- [ ] Have the team prepare a checklist of materials that are needed for the event and where they will be stored.

- [ ] The team could progress to additional qualifying tournaments or the Global Innovation Awards by winning one of the top awards or being nominated by judges.

- [ ] Determine what type of event you're attending and who the organizer of your event is. (If you purchased a Class Pack, the event will be your responsibility. Check out the *Class Pack Event Guide* for more details!)

- [ ] Reflect with the team on their personal and team goals and their accomplishments.

What's Next This Year?

Take your Innovation Project from the current season to another level. Explore the *FIRST* ® LEGO® League Global Innovation Award and talk to your local partner about how you may be eligible.
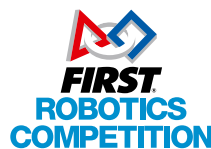
Beyond *FIRST* LEGO League?

Connect with a *FIRST* ® Tech Challenge or *FIRST* ® Robotics Competition team so that your Challenge team can see how they can continue their *FIRST* experience in the future.

Events Complete and All Done?

Here are some tips for wrapping up after your team's last event:

- Clean up and take apart the robot and mission models.
- Allow time for the team to reflect on their experience.
- Inventory the LEGO® set to make sure all the pieces are there.

- Hold a team celebration!
- Share your experience with your friends and classmates.
- Continue developing your Innovation Project.
- Discuss your rubric scores and feedback received.

Judging and Event Resources