

**FIRST
LEGO
LEAGUE**

CHALLENGE

TEAM MEETING GUIDE



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
LEGO
LEAGUE**
DISCOVER

**FIRST
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LEAGUE**
EXPLORE

**FIRST
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LEAGUE**
CHALLENGE

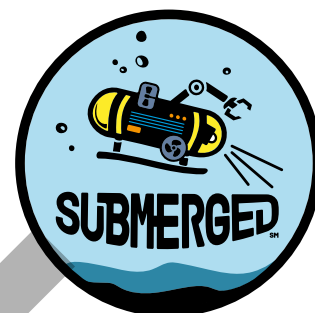
FIRST® DIVESM presented by Qualcomm and **SUBMERGEDSM**

Welcome to the **FIRST® DIVESM** presented by Qualcomm season. This year's **FIRST LEGO** League challenge is called **SUBMERGEDSM**.

This season, children will learn about how and why people explore the oceans. Our discoveries beneath the ocean surface teach us how this complex ecosystem supports a healthy future for the plants and animals that live there.

During each session, teams will experience the engineering design process. There is no set order for this process, and they may go through each step several times in a single session. This means that during a session, children will be exploring the theme and ideas, creating solutions, testing them, iterating and changing them, and then sharing what they've learned with others.

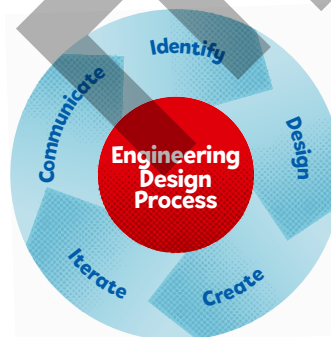
More than 80% of the ocean remains unexplored, offering curious minds deep opportunities to dive into expeditions.



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 a possible 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 as they complete each task. The tips within this guide are just suggestions. Review the Sessions at a Glance page to determine what your team should work on during each meeting. 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.



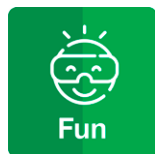
We are stronger when we work together.



We respect each other and embrace our differences.



We apply what we learn to improve our world.



We enjoy and celebrate what we do!



We explore new skills and ideas.



We use creativity and persistence to solve problems.

What Does the Team Need?

LEGO® Education SPIKE™ Prime 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™ or other compatible software) on to the device.



SUBMERGEDSM 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.

Season
Resources

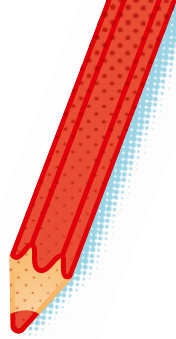


Challenge Mat and Table

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.



Sessions at a Glance



Each session starts with an Introduction and ends with a Share activity. Details for these activities are provided in the session pages that follow. Tips and notes are provided in this guide to assist you in facilitating each team meeting.

It may take 2 hours to complete the tasks in a session. If needed, split sessions into two separate meetings.

Session 1 – Get Started

- SUBMERGEDSM Theme and Innovation Project Exploration
- Build the Mission Models

Session 2 – Training Camp 1

- Tutorial Activities (optional)
- Training Camp 1: Driving Around
- Explore Careers

Session 3 – Training Camp 2

- Training Camp 2: Playing with Objects
- Explore Project Sparks

Session 4 – Training Camp 3

- Training Camp 3: Reacting to Lines
- Brainstorm Project Problem

Session 5 – Investigate Ideas

- Guided Mission
- Identify Project Problem

Session 6 – Identify Solutions

- Pseudocode and Mission Strategy
- Identify Project Solutions

Session 7 – Create Solutions

- Develop Robot Design
- Develop Project Solution

Session 8 – Continue Creating

- Practice Solving Robot Game Missions
- Share and Test Project Solution

Session 9 – Solution Planning

- Iterate and Improve Robot Solution
- Iterate and Improve Project Solution

Session 10 – Iterate Solutions

- Iterate and Improve Robot Solution
- Plan Project Presentation

Session 11 – Presentation Planning

- Plan Robot Design Explanation
- Practice Project Presentation

Session 12 – Communicate Solutions

- Practice Robot Game Matches
- Practice Full Presentations

Session 1 Get Started

Outcomes

The team will:

- Explore the SUBMERGEDSM season theme and get to know each other.
- Make connections from the mission models to the Challenge story and Project Sparks.

- 1 Have the team watch the season videos on the FIRST[®] LEGO[®] League YouTube channel and read pages 3-11 in their *Engineering Notebooks*.
- 2 Provide the digital model building instructions to the team.
- 3 The team can work together or as individuals to build the models. Be sure to inspect and test the models to ensure they function correctly.
- 4 Encourage the team to investigate the mat and the mission models to inspire them. The team should record ideas for possible innovation projects that they could choose.
- 5 Encourage and support discussion about the Challenge story and Project Sparks and how they relate to the mission models.



Season Videos

- 1 → **Introduction**
 - ☐ Watch the season videos and read [pages 3-11](#) to learn how FIRST[®] LEGO[®] League Challenge works and about the SUBMERGEDSM robot game and innovation project.
 - ☐ Get to know your team members and select your team name.
- 2 → **Tasks**
 - ☐ Dive in to the season theme by building the robot game mission models.
- 3
 - ☐ Place each model where it belongs on the mat. Refer to the field setup section of the *Robot Game Rulebook*.
 - ☐ Explore how the models work and how they might connect to the Project Sparks on [page 7](#).
- 4 → **Share**
 - ☐ Get together at the mat.
 - ☐ Show how the mission models connect to the SUBMERGEDSM theme.
 - ☐ Discuss the reflection questions.
 - ☐ Clean up your space.
- 5 → **Reflection Questions**
 - Which mission models look the most interesting to you?
 - How do the models relate to the Challenge story or Project Sparks?
 - What resources will you use to learn more about the season theme?



Session 1 Get Started

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 each session for the team to collaboratively capture their thoughts, ideas, diagrams, and notes.

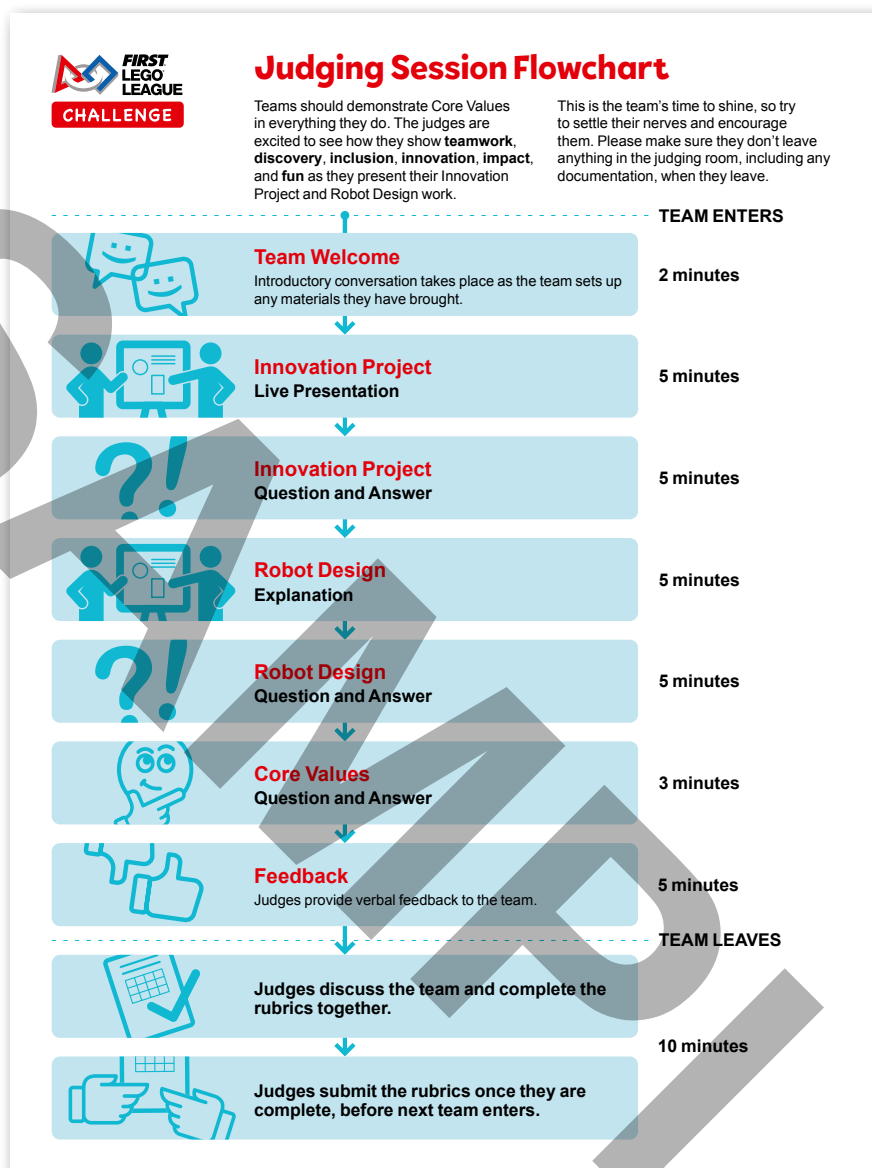
Some sessions will have helpful tips for the team.

Record your ideas during each team meeting!

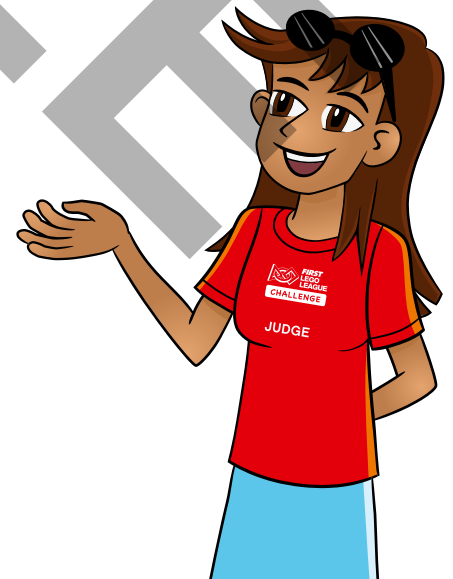


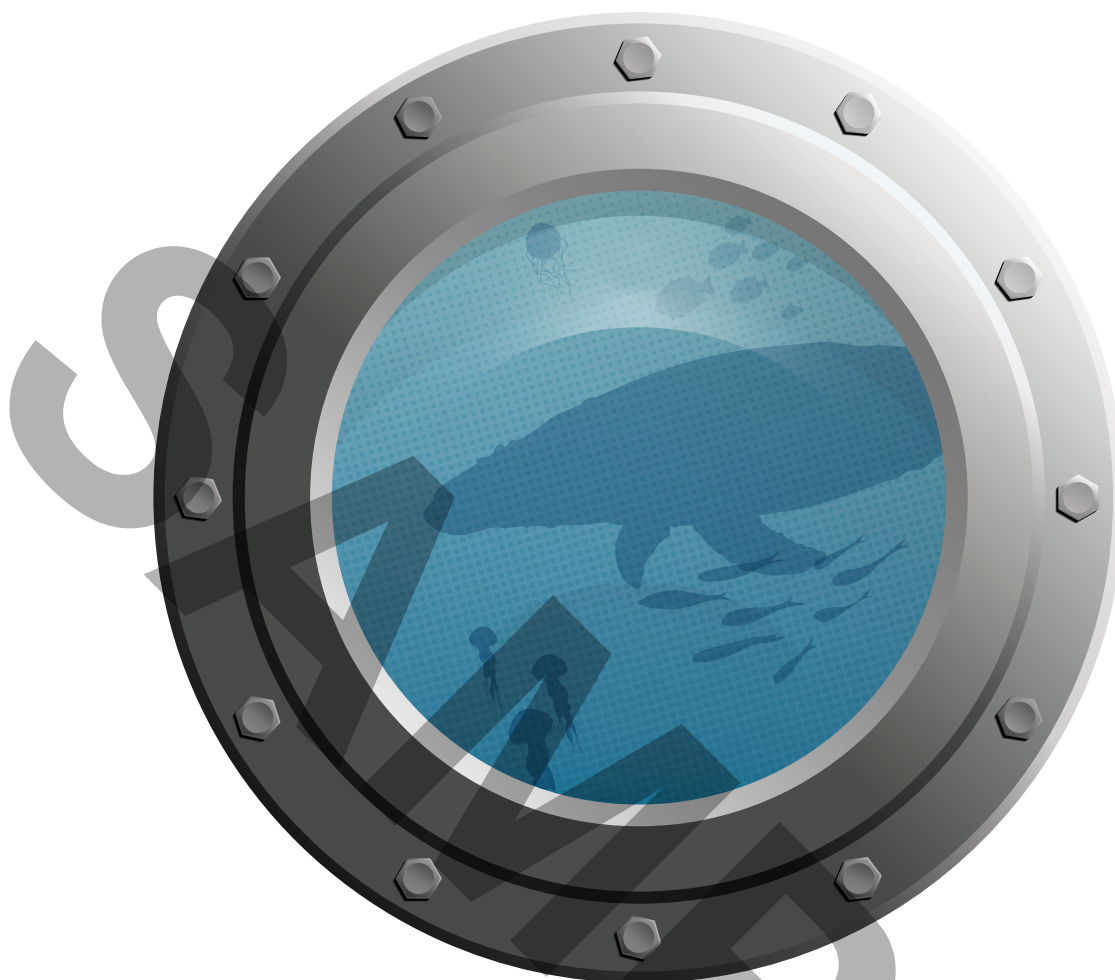
The *Robot Game Rulebook* is a great resource to use throughout the season.

Understanding Judging



If there is too much information for the team to cover in detail, visual aids can be very useful references. Make sure the team practices how they will use them in the judging session, keeping in mind the time limits for sharing their innovation project and robot design work.





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**FIRST
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CHALLENGE

ENGINEERING NOTEBOOK

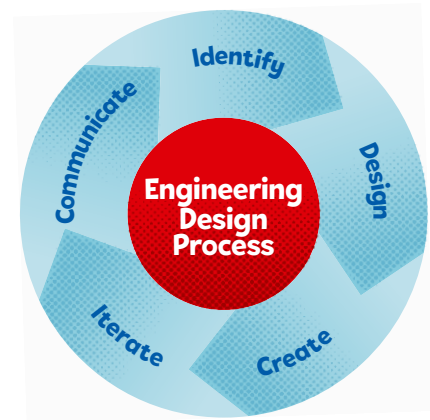


Welcome!

Use the sessions in this *Engineering Notebook* as a guide for your team's journey through the *FIRST® DIVESM* presented by Qualcomm season and *SUBMERGEDSM* challenge.

Use the **Core Values** and the **engineering design process**

throughout your team journey. Have lots of fun as you develop new skills and work together! This notebook is a great resource to share at your judging event, but it isn't required. Check out careers related to the season theme at the end of this notebook.



FIRST® Core Values



Teamwork

We are stronger when we work together.



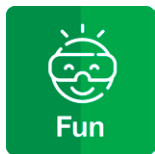
Inclusion

We respect each other and embrace our differences.



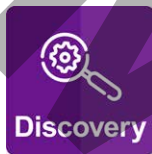
Impact

We apply what we learn to improve our world.



Fun

We enjoy and celebrate what we do!



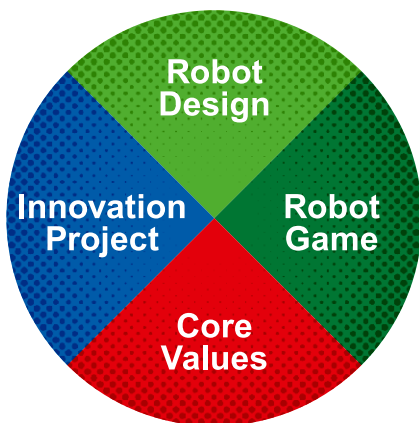
Discovery

We explore new skills and ideas.



Innovation

We use creativity and persistence to solve problems.



Each of these four equally weighted parts of *FIRST® LEGO® League Challenge* accounts for 25% of your total performance at your event.

Core Values should be demonstrated at the event, where you will showcase your team's amazing work on robot design and the innovation project. These three parts will be evaluated during the judging session. Your robot's performance will be evaluated during the robot game.

We express our Core Values through *Gracious Professionalism®* and *Coopertition®*, and this will be evaluated during robot game matches.

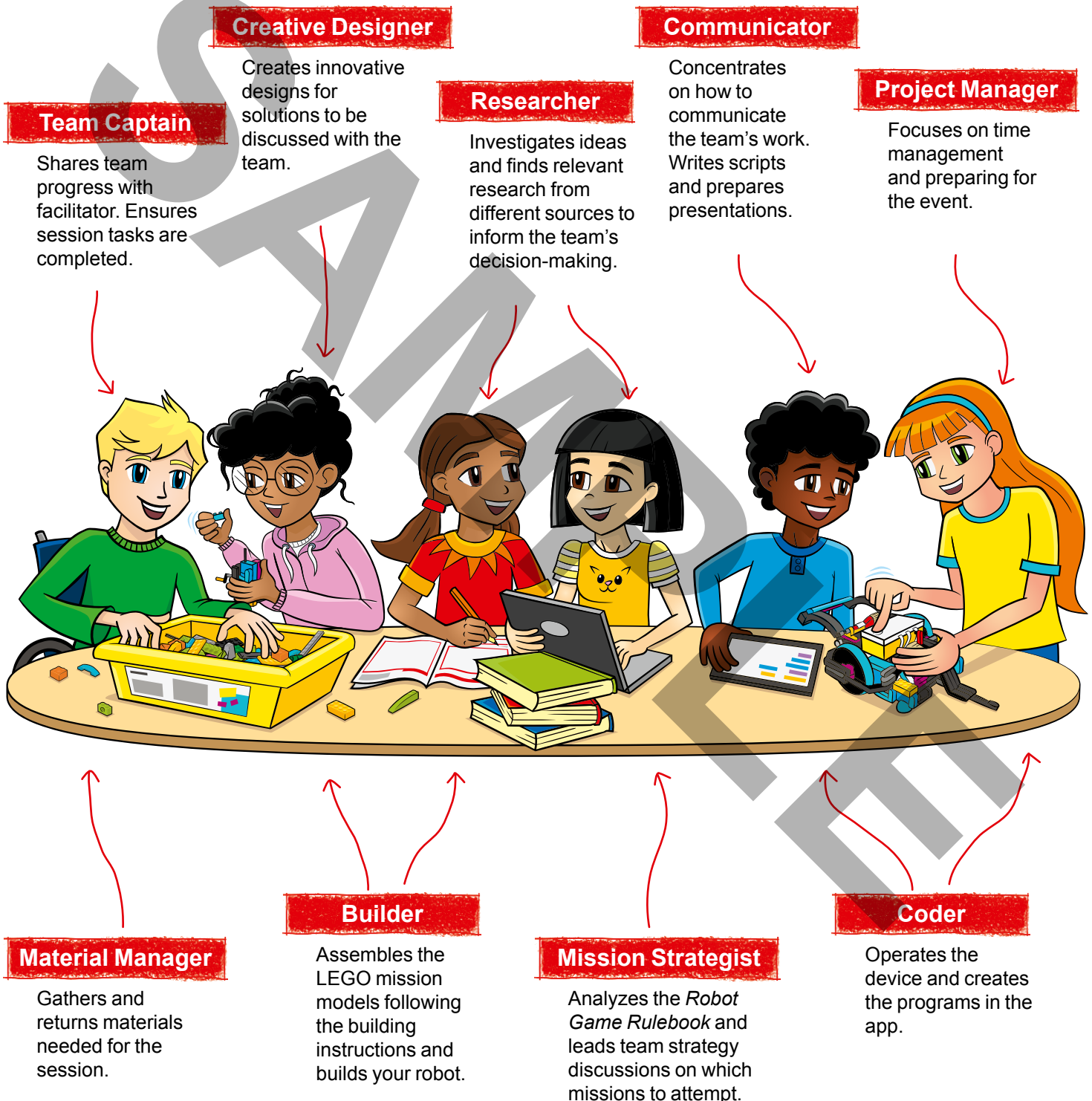
Gracious Professionalism is a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.

Coopertition is showing that learning is more important than winning. Teams can help others even as they compete.

Team Roles

Here are sample roles your team can use during the sessions. Everyone on the team should experience each role throughout their *FIRST*® LEGO® League

Challenge experience. The goal is to build your team to be confident and capable in all aspects of *FIRST* LEGO League Challenge.



Session 1 Get Started

→ Introduction

- ☐ Watch the season videos and read [pages 3-11](#) to learn how *FIRST*® LEGO® League Challenge works and about the SUBMERGEDSM robot game and innovation project.
- ☐ Get to know your team members and select your team name.

→ Tasks

- ☐ Dive in to the season theme by building the robot game mission models.
- ☐ Place each model where it belongs on the mat. Refer to the field setup section of the *Robot Game Rulebook*.
- ☐ Explore how the models work and how they might connect to the Project Sparks on [page 7](#).

→ Share

- ☐ Get together at the mat.
- ☐ Show how the mission models connect to the SUBMERGEDSM theme.
- ☐ Discuss the reflection questions.
- ☐ Clean up your space.

→ Reflection Questions

- Which mission models look the most interesting to you?
- How do the models relate to the Challenge story or Project Sparks?
- What resources will you use to learn more about the season theme?



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

Our Notes:

Record your ideas during each team meeting!



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

Prepare for Your Event

- ☐ **Make a list of what you need to bring to your event. Read over the event day schedule.**
- ☐ **Think about your team.**
How will each person on the team participate in the live presentations and at the robot game?
- ☐ **Reflect on the Core Values your team has used.**
How did you make sure every team member was involved and could share their ideas? What did your team learn from working together on your project and robot this season? Can you provide examples of how your team using Core Values and demonstrating *Gracious Professionalism*®?
- ☐ **Think about all the work you've done on the innovation project.**
Can you describe the problem you chose and how it connects to the season theme? Can you describe

the steps your team took to create, share, and iterate on your project solution? What is innovative about your solution and how could it help others?

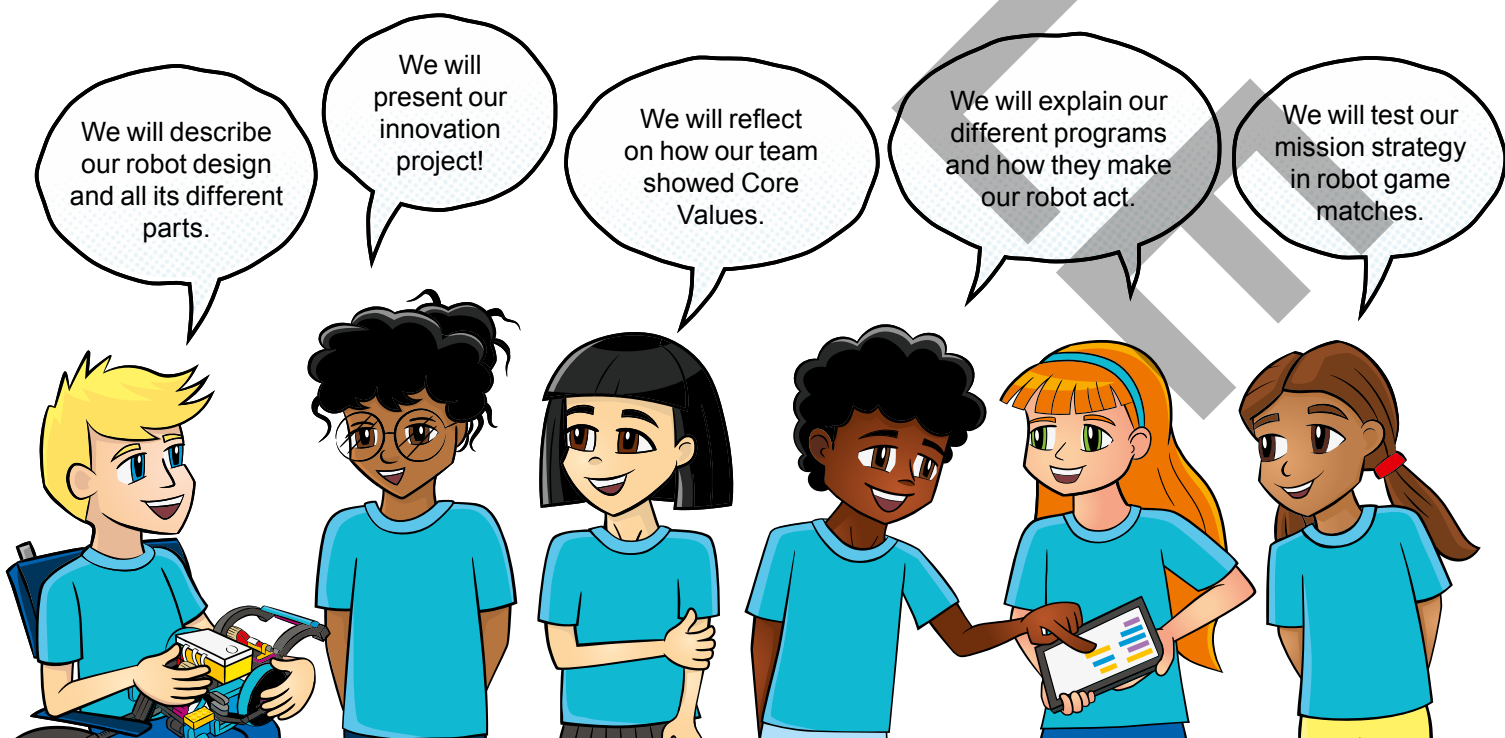
- ☐ **Talk about the programs and attachments you've created for your robot.**
How do your programs match your mission strategy? How do your programs make your robot act?
- ☐ **Think about your robot design.**
Which missions did your team attempt to solve and why? What resources helped your team learn how to build and code your robot? How will you describe your team's testing plan and what improvements you made along the way?

What to Expect at Your Event

- Your team should have fun and show team spirit and enthusiasm at the event. Be sure to display Core Values in everything you do.
- Your whole team will meet with the judges in a single judging session to share your team's journey throughout the season. Think about what you have achieved and what challenges you have faced and overcome.
- You will be able to test your mission strategy by competing in matches at the robot game. You will have several chances to compete, but only your highest score counts.



Watch this video to prepare for your event.



Team Journey



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