Use the sessions in this Engineering Notebook as a guide for your team’s journey through the FIRST® IN SHOWSM season presented by Qualcomm and MASTERPIECE™ 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.

- **Fun**
  - We enjoy and celebrate what we do!

- **Discovery**
  - We explore new skills and ideas.

- **Impact**
  - We apply what we learn to improve our world.

- **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.

**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.

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

- **Team Captain**
  Shares team progress with facilitator. Ensures session tasks are completed.

- **Creative Designer**
  Creates innovative designs for solutions to be discussed with the team.

- **Material Manager**
  Gathers materials needed for session and returns materials.

- **Builder**
  Assembles the LEGO mission models following the building instructions and builds your robot.

- **Researcher**
  Investigates ideas and finds relevant research from different sources to inform the team’s decision-making.

- **Mission Strategist**
  Analyzes the Robot Game Rulebook and leads team strategy discussions on which missions to attempt.

- **Communicator**
  Concentrates on how to communicate the team’s work. Writes scripts and prepares presentations.

- **Project Manager**
  Focuses on time management and preparing for the event.

- **Coder**
  Operates the device and creates the programs in the app.
FIRST® LEGO® League Challenge Overview

CORE VALUES
Demonstrate FIRST® Core Values in everything you do. Your team will be evaluated during the robot game and the judging session.

Your team will:
• Apply teamwork and discovery to explore the challenge.
• Innovate with new ideas about your robot and project.
• Show how your team and your solutions will have an impact and be inclusive!
• Celebrate by having fun in everything you do!

ROBOT DESIGN
Your team will prepare a short explanation on your robot design, programs, and strategy.

Your team will:
• Identify your mission strategy.
• Design your robot and programs and create an effective plan.
• Create your robot and coding solution.
• Iterate, test, and improve your robot and program.
• Communicate your robot design process and everyone's contributions.

ROBOT GAME
Your team will have three 2.5-minute matches to complete as many missions as possible.

Your team will:
• Build the mission models and follow the field setup to put the models on the mat.
• Review the missions and rules.
• Design and build a robot.
• Explore building and coding skills while practicing with your robot on the mat.
• Compete at an event!

INNOVATION PROJECT
Your team will prepare a live, engaging presentation to explain the work you have done on your innovation project.

Your team will:
• Identify and research a problem to solve.
• Design a new solution or improve an existing one based on your selected idea, brainstorming, and plan.
• Create a model, drawing, or prototype.
• Iterate on your solution by sharing it with others and collecting feedback.
• Communicate your solution's impact.
Introduction
(10-15 minutes)

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

Tasks
(50-60 minutes)

Open the SPIKE™ Prime app. Click the Start button.

Tutorial Activities: 1-6

Check out the Robot Game Rulebook for mission details.

Reflection Questions

• How could stopping a motor help you solve a mission with your robot?
• What do you know about your teammates’ interests and hobbies?
• What are resources that can help you learn more?

What are the four parts of FIRST LEGO League Challenge?

Our Notes:
Prepare for Your Event

Make a list of what you need to bring to your event. Read over the event day schedule.

Reflect on the Core Values your team has used.
Can you provide examples of your team using Core Values and demonstrating Gracious Professionalism®?

Think about all the work you've done on the innovation project.
How will you present the problem you researched? How will you explain the process used to create and iterate on your innovation project solutions?

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.

We will describe our robot design and all its different parts.
We will present our innovation project!
We will reflect on how our team showed Core Values.
We will explain our different programs and how they make our robot act.
We will share about our team’s journey.

Talk about the programs 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.
How will you explain the design process and plan used to create and test your robot?

Think about your team.
How will each person on the team participate in the live presentation and show their knowledge?
FIRST® LEGO® League is evaluated equally in four areas: Core Values, Innovation Project, Robot Design, and Robot Game. The judges and referees use the rubrics and robot game scoresheets to make this evaluation.

Make sure you are familiar with the rubrics. It is your team’s job to explain everything to the judges during the session.
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