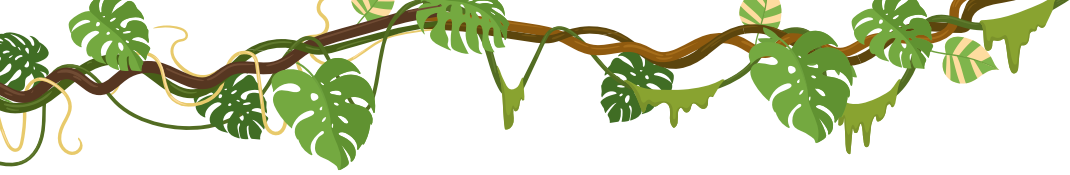


**FIRST[®]
LEGO[®]
LEAGUE**

CHALLENGE

TEAM MEETING GUIDE





FIRST® LEGO® League Global Sponsors

The LEGO Foundation



Challenge division sponsors



Welcome!

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 propose a solution.

FIRST LEGO League Challenge is one of two 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**

EXPLORE

**FIRST
LEGO
LEAGUE**

CHALLENGE

FIRST® CANOPY™ and BIOGLOW™

Biodiversity shows the health of our planet by how plants, animals, and ecosystems work together. Similarly, the *FIRST* LEGO League community shows how powerful teamwork can be. When people with different ideas and skills collaborate, they can solve bigger problems. Scientists and engineers around the world help protect nature by observing animals, monitoring plant diversity, and creating technology inspired by the natural world.

This season, *FIRST* teams and supporters will take inspiration from the natural world and from one another. Using STEM, teamwork, and creativity, participants will explore how innovation can support biodiversity, strengthen communities, and help build a healthier, more connected planet. Together, we can learn from nature and design a thriving future for our shared home.



BIOGLOW™ Innovation Project

This season, your challenge is to identify a problem that puts biodiversity at risk and design an innovative solution that can help.

More information can be found on page 5 of the *Engineering Notebook*.

The Coach's Role

As a coach in *FIRST*® LEGO® League Challenge, your job is to guide and support your team while allowing them to take ownership of their work. The team will look to you to help them stay organized, ask thoughtful questions, and provide tools or resources when needed.

You don't need to be an engineer to be a great coach – your goal is to create a space where creativity, curiosity, and teamwork thrive and every team member feels empowered to contribute.

Coaches in *FIRST* LEGO League Challenge will . . .

- **Facilitate Problem-Solving and Exploration:** Guide the team as they design and program their robot, tackle the robot game missions, and develop their innovation project solution.
- **Promote Teamwork:** Encourage all team members to share ideas, collaborate, and respect each other's contributions. Ensure every voice is heard and every team member feels valued.
- **Champion Core Values:** Model the *FIRST*® Core Values of Discovery, Innovation, Impact, Inclusion, Teamwork, and Fun. Celebrate how your team demonstrates these values inside and outside of team meetings.
- **Prepare the Team for Events:** Help the team organize their work, practice presenting to judges, and get comfortable explaining their robot, programming, and project solution.
- **Be a Role Model:** Celebrate every step of progress, no matter how big or small. Encourage resilience, a growth mindset, and a willingness to tackle new challenges.

Using this Guide

The sessions provide a guided experience for *FIRST* LEGO League Challenge. The sessions are designed to be flexible so that teams of varying experience levels can use the materials. Page 9 describes the sequence of objectives, while each session page shares specific outcomes. Remember, the tips and timing within this guide are just suggestions, and you can adapt to meet your team's needs.

FIRST Core Values

The *FIRST* Core Values are fundamental to *FIRST* and unique to its programs. They emphasize friendly collaboration, respect for the contributions of others, teamwork, learning, and community involvement and are part of our commitment to fostering, cultivating, and preserving a culture of equity, diversity, and inclusion.

Our community expresses the *FIRST* philosophies of *Gracious Professionalism*® and *Coopertition*® through the *FIRST* Core Values.



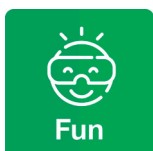
We are stronger when we work together.



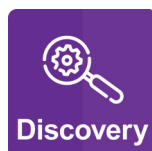
We respect each other and embrace our differences.



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.

FIRST® LEGO® League Challenge Events

At the event, your team's robot design and innovation project will be presented to the judges during the judging session, and their robot performance will be evaluated at the robot game. Core Values are evaluated in all parts of their work, and they will receive scores from the judges and referees for how they apply them.

CORE VALUES

Your team will:

Demonstrate *FIRST*® Core Values in everything you do.

- 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!

INNOVATION PROJECT

Your team will:

Prepare a live, engaging presentation to explain the work you have done on your innovation project.

- **Identify** and research a problem.
- **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 potential impact.

ROBOT DESIGN

Your team will:

Prepare a short explanation on your robot design, programs, and strategy.

- **Identify** your mission strategy.
- **Design** your robot 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:

Compete in three 2.5-minute matches to complete as many missions as possible.

- **Build** the mission models and set up the field mat.
- **Learn** 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!

What Does the Team Need?

LEGO® Education SPIKE™ Prime Set



SPIKE Prime set



Expansion set

Note: The LEGO® Education SPIKE™ Prime is shown, but LEGO Education SPIKE Essential, MINDSTORMS® EV3, MINDSTORMS Robot Inventor, Powered Up, and equivalent NXT and RCX are also allowed.

Electronic Device

Each team will need at least one compatible device 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.



BIOGLOW™ Challenge Set

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



Season Resources

Challenge Mat and Table

Set up a table with the mat and models in your classroom or meeting space. Teams can practice on the mat by placing it on the floor. However, robot game matches at official events will be played on a table complete with sidewalls. Instructions to build a table can be found on the Season Resources page.



Managing the Team



FACILITATOR TIPS

- The team will be doing the work. You will facilitate their journey, remove any major obstacles and ensure their safety. Guide them as they work independently through the tasks provided in each session.
- Some sessions might take longer than others to complete. You might need to work on a session in multiple team meetings depending on how long you meet. Be flexible!
- Set team guidelines, procedures, and expected behaviors for your meetings.
- Use the guiding questions in the sessions to provide focus and direction to the team.
- The Project Sparks connect to the Technology Connections on page 31 of the *Engineering Notebook*.
- Teammates should be encouraged to work with each other, listen to each other, take turns, and share ideas. Example team roles are found on page 9 of the *Engineering Notebook*.

MATERIAL MANAGEMENT

- Place any extra or found LEGO® pieces in a container. Have children who are missing pieces come to the container to look for them.
- Wait to dismiss your team until you look over their SPIKE™ and Challenge Set.
- The lid of the SPIKE Prime set can be used as a tray to keep pieces from rolling away.
- Use plastic bags or containers to store any unfinished builds or assembled models.
- Designate a storage space for the built mission models and your challenge mat/table.
- The teammate in the material manager role can help with the process of clearing away and storing materials.

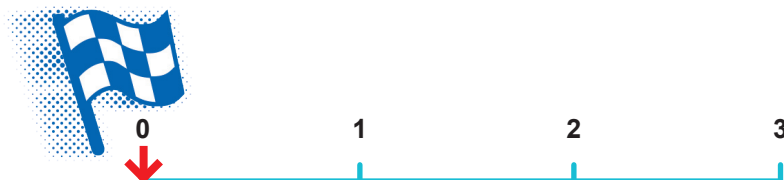
ENGINEERING NOTEBOOK TIPS

- Read the *Engineering Notebook* carefully. The team will share the notebooks and work on them collaboratively.
- The notebook contains relevant information, guides the team through the sessions, and is a great place for team members to document their ideas and progress.
- The team can use pages 26 and 27 in the *Engineering Notebook* to review the rubrics and scoresheets and to prepare for the event.



Pre-Season Checkpoint

Below are some helpful steps for getting started with coaching *FIRST*® LEGO® League Challenge. Use this checkpoint to help you get ready before your first session with the team.



- ☐ Confirm your team is officially registered with your local Program Delivery Partner.
- ☐ Ensure you have received all materials needed to implement the program. See page 6 for what you need.
- ☐ Decide how often and where your team will meet. Communicate this schedule with team members.
- ☐ Familiarize yourself with the contents of the **Challenge Set** and watch the **season videos** on the *FIRST* LEGO League YouTube channel.
- ☐ Read the **Engineering Notebook** and all pages of this **Team Meeting Guide**. These guides are full of helpful tips and resources to support you through the sessions.
- ☐ Explore the **FIRST® Core Values**. These are the essential foundations for your team.
- ☐ Ensure you have at least one device with internet access and the **SPIKE™ app** installed.
- ☐ Unpack the LEGO® Education set and sort the elements into the trays. Make sure the controller is charged and all updates are completed.
- ☐ Browse the available content on the **Season Resources** page and **Multimedia Resources** list.
- ☐ Look over the **judging rubrics** to see the evaluation criteria for robot design and innovation project solutions.

Session 1-4 Tips

CORE VALUES

Have the team set goals for what they want to accomplish together and have individual team members set their personal goals.

ROBOT DESIGN

If the team is new to using their LEGO Education set, take some time to get them acquainted with it. Have the team complete the tutorial activities.

INNOVATION PROJECT

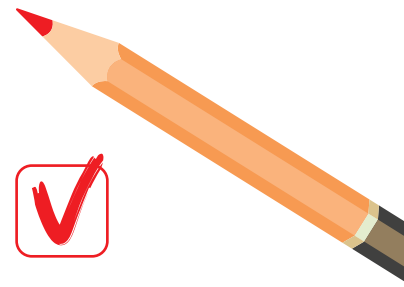
Explore the Project Sparks and narrow the team's focus on which problem they want to work on. They can select a Project Spark problem or choose one of their own.

ROBOT GAME

Place the mat, models, the robot, and its attachments in a safe location after each session if they have to be stored.

Sessions at a Glance

Each session starts with an introduction and ends with reflection questions. 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 two hours to complete the tasks in a session. If needed, split sessions into two separate meetings.



Session 1

- BIOGLOW™ Theme and Innovation Project Exploration
- Build the Mission Models

Session 2

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

Session 3

- Training Camp 2: Playing with Objects
- Identify Project Problem

Session 4

- Training Camp 3: Reacting to Lines
- Research Project Solutions

Session 5

- Guided Mission
- Research Project Solutions

Session 6

- Pseudocode and Mission Strategy
- Develop Project Solution

Session 7

- Develop Robot Design
- Develop Project Solution

Session 8

- Practice Solving Robot Game Missions
- Collect Feedback on Solution

Session 9

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

Session 10

- Iterate and Improve Robot Solution
- Plan Project Presentation

Session 11

- Plan Robot Design Explanation
- Practice Project Presentation

Session 12

- Practice Robot Game Matches
- Practice Full Presentations

→ In this session the team will . . .

- ☐ Explore the BIOGLOW™ season theme and get to know each other.
- ☐ Build the mission models and make connections to the Challenge story and Project Sparks.

Session 1



Season
Resources
Page

→ Tips

- 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 Provide the model building instructions and show the field setup video 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. Use the *Robot Game Rulebook* and mission video to understand how the models work.
- 4 Encourage the team to investigate the mat and the mission models to inspire them.
- 5 Lead a discussion about the Project Sparks and Challenge story and how they relate to the mission models.

Tip

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

→ Introduction

- 1 ☐ Watch the season videos and read pages 3-9 to learn how *FIRST*® LEGO® League Challenge works and about the BIOGLOW™ robot game and innovation project.
☐ Get to know your team members and think of a team name.

→ Tasks

- 2 ☐ Use the building instructions to build the robot game mission models.
☐ Set up the game field. Read page 7 of the *Robot Game Rulebook* to learn how to set up the mat.
- 3 ☐ Explore how the models work and how they connect to the Project Sparks on page 6.
- 4 ☐ Discuss the reflection questions and record your progress.

→ Clean Up

→ Reflection Questions

- 5
 - How do the mission models relate to the Project Sparks?
 - Which mission models look interesting to you?
 - How does your team plan to have fun while working on the game and project?

Session 1

Use the note space to record information about your team and what you worked on.

Our notes:

Tip

During each meeting, record what you have learned and what you want to improve on.



The Season Resources page is where you can find links to all videos, instructions, and materials your team will need!

Session 2

→ In this session the team will . . .

- ☐ Build a driving base and code it to move forward, move backward, and turn.
- ☐ Explore and research ideas for their innovation project.

Session 2

Discovery: We explore new skills and ideas.



Our notes:

→ Introduction

- 1 ☐ Think about how you will use the Core Value of **discovery** in your team's journey.
- ☐ Record what your goals are and what you hope to learn on the Team Progress sheet on page 8.

→ Tasks

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

2



Tutorial Activities:
1-6 (optional)

3



Competition Ready Unit: Training
Camp 1: Driving Around

4

- ☐ Use the skills you learned to navigate your robot to one of the mission models.
- ☐ Talk to your team about your ideas for the innovation project.

5

- ☐ Discuss the reflection questions and record your progress.

→ Clean Up

→ Reflection Questions

- What coding and building skills did you learn that you can apply in the robot game?
- How did you use the **Engineering Design Process** in this session?
- What Project Sparks interest your team? How will your team research the problem?

Tip

Try using the Pseudocode worksheet on page 28 to map out your robot's path and programming steps.

Make copies of the Pseudocode worksheet and encourage the team to develop their programming skills.

→ Tips

- 1 Teams will explore the six *FIRST* Core Values throughout their season.
- 2 The tutorial activities in the SPIKE™ app are optional but recommended if your team has minimal coding and building experience.
- 3 After a program is downloaded on to 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 The team should reference the innovation project page and begin identifying problems. The team will need to decide on their problem statement by Session 3.

Tip

The team should discuss the reflection questions before they clean up. Reflecting and sharing at the end of the session is an important way for the team to summarize their knowledge and identify next steps.

→ In this session the team will . . .

- ☐ Identify their innovation project problem statement and research solutions. (Revisit page 5 of the *Engineering Notebook*.)
- ☐ Code their robot to avoid obstacles using a sensor and to power an attachment.

→ Tips

- 1 If your team has already agreed on the focus of their project, encourage them to start researching. You can find helpful links on the Season Resources page.
- 2 While the team might not choose every member's preferred problem, they should choose something everyone supports.
- 3 The team will write their problem statement on the Innovation Project Planning page. Remember, teams can choose one of the problems from the Project Sparks.
- 4 Encourage the team to use their *Engineering Notebooks* and to take notes when researching their ideas.
- 5 Have the team think about how to use the attachment from the robot lesson to complete missions.

Tip

Reference the *Robot Game Rulebook* to understand how to score points in the game.

Session 3

→ Introduction

- 1 ☐ Review the innovation project information on page 5 and the Project Sparks on page 6.
- 2 ☐ Pick a Project Spark or one of your own ideas and think of the problem your team will explore.

→ Tasks

- 3 ☐ Record your team's problem statement on page 29.
- ☐ Open the SPIKE™ app. Find your lesson.



Competition Ready Unit:
Training Camp 2: Playing
with Objects

- 4 ☐ Talk about the skills you learned in this lesson and how they will help you in the robot game.
- ☐ Try it out! See if you can code your robot to attempt a mission.
- 5 ☐ Discuss the reflection questions and record your progress.

→ Clean Up

→ Reflection Questions

- What additional research is necessary to select an idea for the project?
- What objects does your robot need to avoid in the robot game?
- What mission does your team want to attempt next?

Tip

Consider why the problem exists, why it is important to fix, and who would be affected if the problem were solved.

Session 3

A problem statement describes the problem that your team wants to solve.

Our notes:



Session 4

→ In this session the team will . . .

- ☐ Decide what research is necessary to learn about their project problem.
- ☐ Code their driving base to detect a line using a sensor.
- ☐ Begin to think about their strategy for the robot game.

→ Tips

- 1 Examples of research sources include websites, videos, books, magazines, personal stories, user experiences, and interviews.
- 2 Plug in the controller and open the app periodically to check for software and firmware updates.
- 3 Have the team follow the program on the screen to see how it matches the robot's actions. This will help them debug their programs.
- 4 Try to start the robot in the same or a very similar place each time in one of the launch areas.
- 5 Teams can use page 30 of the *Engineering Notebook* to take notes on the missions. Make copies of this page as needed.

Session 4

A mission strategy determines which missions to attempt and the order you will attempt them.

Our notes:

1 → Introduction

- ☐ Work as a team to identify what research is needed to learn about existing solutions.
- ☐ Determine how your team will create your innovation project solution.

2 → Tasks

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

3 Competition Ready Unit: Training Camp 3: Reacting to Lines

- 4 ☐ Talk about the skills you learned in this lesson and how they will help you in the robot game.
- 5 ☐ Try it out! See if you can use the skills you learned to attempt another mission.
- ☐ Discuss the reflection questions and record your progress.

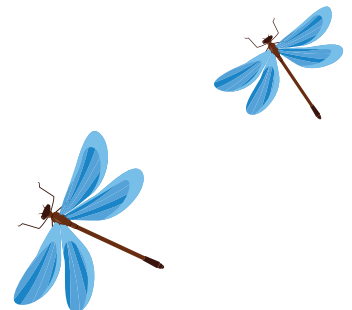
→ Clean Up

→ Reflection Questions

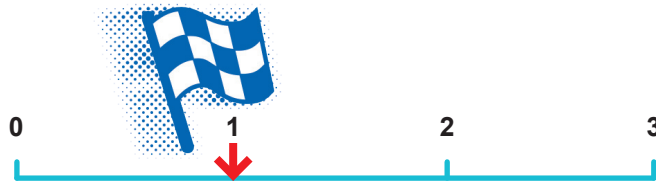
- How will your team record your research on your project problem?
- How did testing your program help make your robot more accurate?
- How could you use the lines on the mat in your mission strategy?

Tip

As you try to complete missions in the robot game, record what works and what your team wants to improve.



Checkpoint 1



- ☐ The team has bonded and are working well together. If they need more support to achieve this, do some team-building activities and review the Core Values.
- ☐ The team should continue practicing the new robot skills they have learned.
- ☐ All models should be built and placed on the mat and secured with the Dual Lock squares.
- ☐ Remember to be flexible with the sessions and allow the team to spend more time with the project or robot game, if needed.
- ☐ The team has reviewed the missions and rules in the *Robot Game Rulebook*.
- ☐ The team has selected the focus of their innovation project and has written their problem statement. They should now be researching their problem and any existing solutions.
- ☐ Check in with the team on their progress on their personal and team goals (page 8 of the *Engineering Notebook*). They can adjust their goals based on information they have learned in the first four sessions.

Session 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

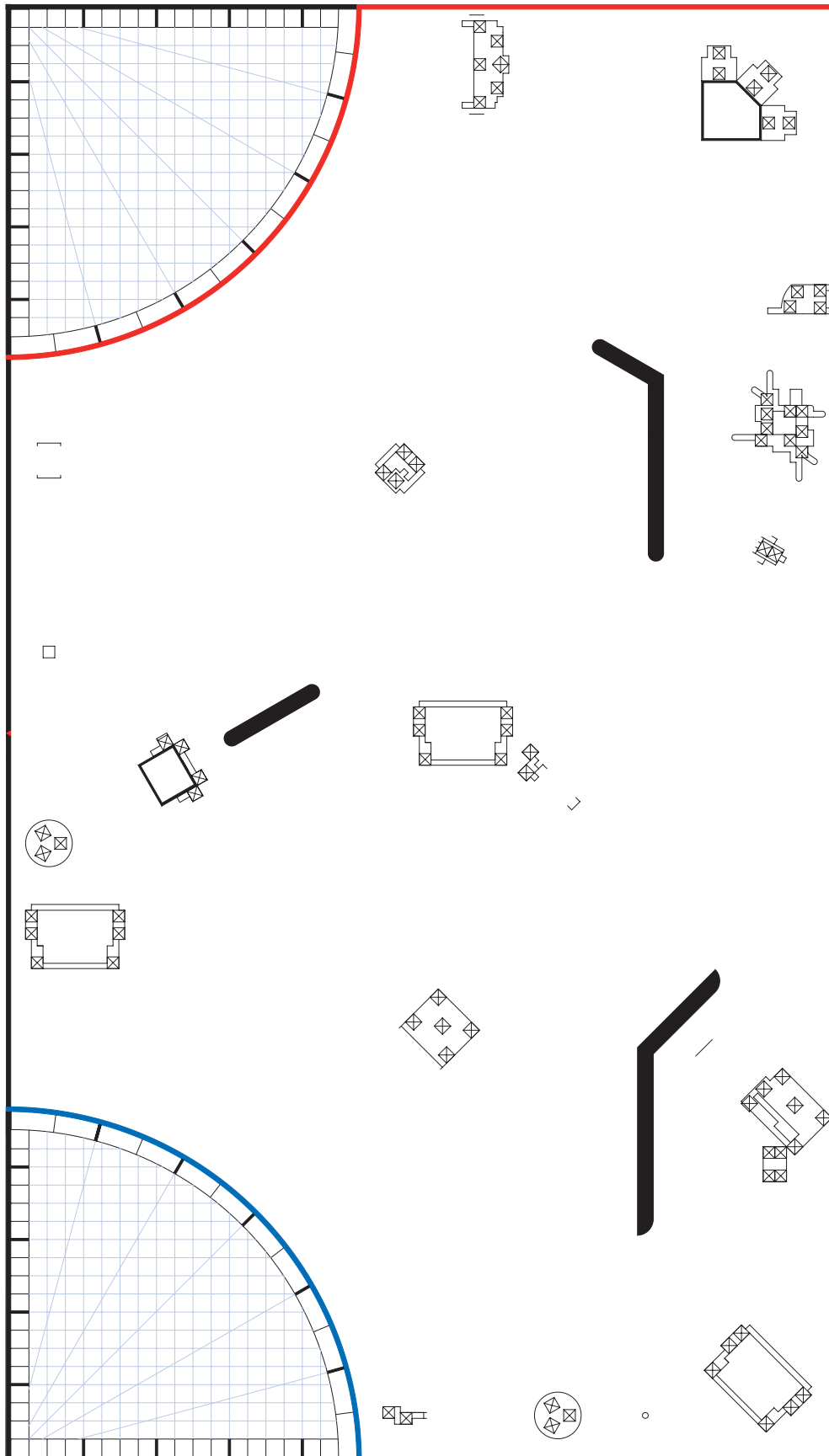
The team will begin to develop their innovative solution and share their ideas with others for feedback. Remind the team to take notes during the development process so they can present their progress to the judges.

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 detection.
- Have easy access to home.

Wireframe



→ **In this session
the team will . . .**

- ☐ Apply coding principles to the guided mission.
- ☐ Decide to propose a new solution to the problem or improve on an existing solution.

Session 5

→ **Tips**

- 1 Team-building activities are great for teams to develop their Core Values and learn how to work together. They can also be used to give the team a fun break from their hard work.
- 2 Teams should be able to clearly define the problem they have chosen. This is evaluated during the judging session at the event.
- 3 Have the team reference the rubrics often.
- 4 Teams should use the Engineering Design Process to create their solution to the problem.
- 5 The team should always record what they learn and note any questions that still need to be researched to develop their work on the project and robot game.

→ **Introduction**

- 1 ☐ Think about **teamwork** and your team. Talk about ways your team has been learning and working together.

→ **Tasks**

- 2 ☐ Continue to research the problem you have chosen.
- ☐ Use this page and page 29 to capture your research.
- 3 ☐ Decide whether your team will propose a new solution or improve on an existing one.
- 4 ☐ Select a solution to develop with your team.

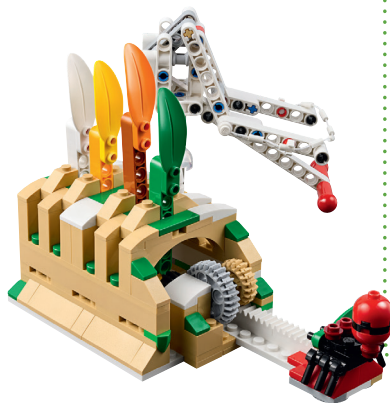
Session 5

Teamwork: We are stronger when we work together.

Innovation project notes:

Tips

- Existing solutions could be adapted and combined with other ideas.
- List what you learned about the problem and solutions and provide the resources you used (e.g., books, news articles, or interviews).





Robot game notes: **6**



→ Tasks

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



**Competition Ready Unit:
Guided Mission**



**Competition Ready Unit:
Assembling an Advanced
Driving Base (optional)**

- 7** ☐ Practice the guided mission until it works consistently.
- 8** ☐ Continue attempting other missions in the robot game.
- ☐ Discuss the reflection questions and record your progress.

→ Clean Up

→ Reflection Questions

- 9** • Who could your team talk to about the problem you selected? What questions would you ask them?
- How will your team work together to develop an innovative solution to the problem?
- What does the robot game teach you about **Coopertition**?
- 10** • How could you use what you learned in the guided mission to complete additional missions?



Tip

Coopertition means that teams help and cooperate with each other, even as they compete.

→ Tips

- 6** The team can take notes about the robot game in the session pages or on page 30.
- 7** If the team is sharing one robot, they can code on individual devices and then take turns running their programs on the robot.
- 8** The provided program for the guided mission will not only solve the mission but also be helpful to use on other missions. A guided mission is only provided for SPIKE™ Prime sets.
- 9** The team can talk to anyone to receive feedback on their project ideas.
- 10** If an attachment is needed for a mission, you could keep it in a plastic bag labeled with the mission number.

→ In this session the team will . . .

- ☐ Begin developing the solution to their innovation project problem.
- ☐ Create a mission strategy plan and write pseudocode for a mission.

Session 6



→ Tips

- 1 Provide extra paper or a shared online file for the team to capture the process used to create their robot and innovation project solutions.
- 2 The team will be judged on the robot used in the game, their project solutions, and the Engineering Design Process.
- 3 Take some extra time with the team if needed to explore all the solution ideas and narrow it down to one.
- 4 The Innovation Project Planning page in the *Engineering Notebook* should be completed over multiple sessions to help the team document their process.
- 5 Let the team be creative when developing their prototype or drawing. It's important that they can explain it clearly and share details.

→ Introduction

- ☐ Talk about **innovation** and share examples of how your team has been creative while solving problems.
- 1 ☐ Complete the "Halfway There" section of the **Team Progress** sheet on page 8.

→ Tasks

- 2 ☐ Plan how you will develop a solution to your problem. Use the **Innovation Project Planning** sheet on page 29 to record your steps.
- 3 ☐ Use a variety of sources and keep track of them in this *Engineering Notebook*.
- 4 ☐ Determine what materials may be needed to create a prototype model or drawing of your solution.
- 5 ☐

Session 6

Innovation: We use creativity and persistence to solve problems.

Innovation project notes:



Tip

Look at the innovation project rubric to learn what the judges will ask about your solution.



Pseudocode is a written description of the steps for your planned robot program.

Robot game notes:

→ Tasks

- 6 ☐ Review the "Robot Game Missions" video and *Robot Game Rulebook*.
- ☐ Complete the Pseudocode sheet for a selected mission on page 28.
- 7 ☐ Upload your program ideas to your robot using the SPIKE™ app and test them.
- ☐ Continue to practice completing missions in the robot game.
- 8 ☐ Discuss the reflection questions and record your progress.

→ Clean Up

9 → Reflection Questions

- What is the next step in developing your innovation project solution?
- How will documenting your progress on the innovation project help your team's judging session at the event?
- How can your robot's attachments and code support your team's mission strategy?
- 10 • How can you iterate to improve your robot design used in previous tasks?



Tip

Think about what attachments and sensors you will use during the game and how you will change them.

→ Tips

- 6 The team should pause to reflect on the last few sessions. Ask the team what they feel most proud of so far. What are they excited about?
- 7 You could provide sticky notes or planning cards for the team to place on the mat to help map out their mission strategy.
- 8 Encourage the team to find the missions where points can be scored most easily and try them first.
- 9 Allow the team to think about the reflection questions or write their answers before sharing. This leads to a deeper understanding of their strategy.
- 10 Tell the team that trial and error is part of the process and will ultimately lead to more success. The judges at the event will want to hear what they learned along the way.

→ In this session the team will . . .

- ☐ Continue developing their innovation project solution and create a model or prototype.
- ☐ Design and iterate on their robot to complete additional robot game missions.

→ Tips

- 1 Help students recognize that *Gracious Professionalism*[™] is something they do, not just something they talk about. Point out examples when you can.
- 2 Look for opportunities locally or online to learn more about the team's innovation project ideas.
- 3 Provide a variety of materials for the team to use to make a prototype model or drawing of their project solution.
- 4 Encourage the team to record their changes so they can clearly explain their process during judging.
- 5 A prototype does not need to be functional when it's presented to judges. The team should be able to describe in detail how it would work.

Session 7

→ Introduction

- 1 ☐ Talk about **Gracious Professionalism** and the ways your team demonstrates this in everything you do.

→ Tasks

- 2 ☐ Continue to develop your innovation project solution.
- ☐ Draw your solution and discuss how it solves the problem.
- 3 ☐ Create a prototype model or detailed drawing of your solution.
- 4 ☐ Continue to document the process you use to develop your solution on the Innovation Project Planning sheet and throughout this *Engineering Notebook*.

Tip 5

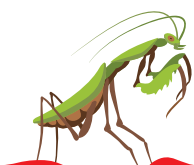
The prototype does not need to be functional but should help you to explain your solution to others.



Session 7

Gracious Professionalism[®]: We show high-quality work, emphasize the value of others, and respect individuals and the community.

Innovation project drawing and notes:





Practice explaining how the program on your device is making your robot move.

Robot game notes:

6

→ Tasks

- ☐ Discuss which missions your team has attempted and which missions you still want to try.
- ☐ Continue to test and improve your robot and its attachments to complete missions in the robot game.
- ☐ Create a program for each new mission you attempt or combine mission solutions into one program.
- ☐ Revisit previous lessons to develop your coding skills or work on solving the missions.
- ☐ Discuss the reflection questions and record your progress.

7

8

9

→ Clean Up

→ Reflection Questions

- Can you describe your solution in a way that is easy for others to understand?
- Who can you share your solution with for feedback?
- How can you iterate to improve your robot design or your attachments?
- How do you determine if your robot is successful at a mission or if it needs improvements?

10

Tip

You can improve the robot used in the previous sessions or create a new design.

→ Tips

6

Different members of the team can be responsible for specific missions and develop and own the robot run for those missions.

7

Remind teams to clearly name and organize their programs so they can be accessed quickly.

8

When the team is developing their mission strategy, have them determine which launch area will be the starting position. Make sure there is enough room for the whole robot to fit inside the launch area.

9

Encourage the team to explain their program as the robot moves and make notes about what they observe during testing.

10

When the team is improving the robot or attachments, tell them to change one thing at a time. This will help them see what caused improvement and build stronger engineering thinking.

→ **In this session
the team will . . .**

- ☐ Evaluate and improve on their innovation project solution.
- ☐ Design robot attachments and create programs to solve missions.

Session 8

→ **Tips**

- 1 The team can create a survey to evaluate their solution or ask for feedback from someone affected by the problem.
- 2 The team should iterate and improve their innovation project solution following feedback from others.
- 3 Consider joining a webinar or watching interviews to learn from experts.
- 4 The team should reference the project rubric so they can be prepared for judging at the event.
- 5 The team should think about who their innovative project solution is for.

→ **Introduction**

- ☐ Talk about inclusion and share examples of how your team makes sure everyone is respected and their voices are heard.

→ **Tasks**

- 1 ☐ Share and collect feedback on your ideas. Use page 29 to record the feedback.
- 2 ☐ Decide what feedback to use to iterate on your solution.
- 4 ☐ Determine if you can test your updated solution.

3

Tip

Seeking advice from others, even other teams, is a great way to learn and improve your skills.



Session 8

**Inclusion: We respect each other
and embrace our differences.**

Innovation project notes:

5





Think about how you can use simple building techniques in a creative way to solve missions.

Robot game notes:

You could:

Describe the attachments you built.
Explain your different programs and what the robot will do.
Explain your robot design while looking at the rubric criteria.

10



6

→ Tasks

- ☐ Choose another robot game mission to work on.
- ☐ Think about how each new mission fits into your mission strategy.
- ☐ Iterate and refine your program and attachments so your robot completes the mission reliably.
- ☐ Document your design and testing process for each mission.
- ☐ Discuss the reflection questions and record your progress.

7

8

→ Clean Up

→ Reflection Questions

- What changes will you make to your project solution after getting feedback?
- How does your team decide which missions to attempt?
- In what order will you run the missions in the robot game?
- How has your team used Core Values to develop your robot and project solution?

9

Tip

Judges will want to hear what changes you made along the way to understand your design and testing process.

→ Tips

- 6 The team should think about strategy when choosing missions to solve. Multiple missions can be completed on the same run to save time.
- 7 Encourage the team to discuss how their program works. Break the program into blocks that control one movement.
- 8 Remind teams that simple, repeatable designs often outperform complicated ones. Encourage them to test missions multiple times and change attachments or code until the robot is consistent.
- 9 The robot's starting point in the launch area strongly influences where it ends up. Have the team keep good notes about where to place the robot. The Pseudocode sheet in the *Engineering Notebook* can be used for this purpose.
- 10 Encourage the team to reference the robot design rubric and explain how building and coding techniques helped solve missions. This will help build their confidence before the judging session.

Checkpoint 2



- ☐ The team has completed all the robot lessons outlined in Sessions 1-8.
- ☐ The team has selected an innovation project problem, conducted research, designed a solution, and shared it with others.
- ☐ Visit the Season Resource page to print copies of the judging flowchart, rubrics and any other information that will help prepare for your event.
- ☐ Provide the team with the judging documents.
- ☐ If you are implementing a Class Pack, you can make copies of the Class Pack rubric from the *Class Pack Guide*.

Session 9-12 Tips

CORE VALUES

Make sure the team can provide concrete examples of the Core Values they use. Don't forget *Coopertition*® and *Gracious Professionalism*®.

ROBOT DESIGN

The team should continue to attempt new missions and think about their mission strategy. Practice combining multiple mission attempts during a 2.5-minute game to prepare the team for event day. Remind the team to document changes to their mission strategy so they can share their progress with the judges.

INNOVATION PROJECT

The team will need plenty of time to iterate, improve, and create a model or drawing of their innovation project solution. From Session 9 on, they should focus on progress toward their innovation project solution and presentation using the rubric as a guide.

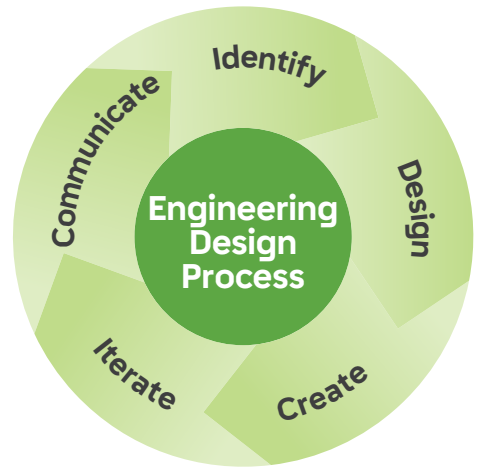
ROBOT GAME

The team needs to practice a reliable and consistent robot run that they know will score them points. Track how much time it takes for each run to understand what other missions could be attempted in the game.

Understanding the Rubrics

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 to solve problems using this process. Team members need to demonstrate and explain everything they have worked on during the judging session.



Judging Session Feedback

First LEGO League Challenge

Team Name: _____ Judging Room: _____

Instructions
This sheet should be used to record written feedback following the Innovation Project presentation and Robot Design presentation. The FIRST Core Values are the five through which judges watch the team's presentation and evaluate their progress.
The rubrics and feedback page will be returned to teams at the end of the event.

Great job... Think about...

Core Values - How did the team demonstrate teamwork, democracy, inclusiveness, respect, and fairness in their work?

Innovation Project - How did the team identify and approach a problem connected to the award theme?

Robot Design - How did the team approach solving robot game missions using building and coding?

If the team is a candidate for one of these awards, please tick the appropriate box. Check only your own perspective unless indicated otherwise on the award sheet.

Feedback - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Robot Design - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Robot Design - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Innovation Project

First LEGO League Challenge

Team Name: _____ Judging Room: _____

Instructions
Teams should communicate to the judges their achievement in each of the following criteria. The rubric should be filled out according to the Innovation Project presentation.
Judges are required to tick the box for each separate criterion to indicate the level the team has achieved. If the team EXCEEDS, a short comment in the EXCEEDS column is required.

BEGINNING 1	DEVELOPING 2	ACCOMPLISHED 3	EXCEEDS 4
IDENTIFY - Team identified a clearly defined problem that was well researched.			
☐ Problem definition of the problem	☐ Problem definition of the problem	☐ Problem definition of the problem	☐ Problem definition of the problem
☐ Research evidence of research	☐ Research evidence of research	☐ Research evidence of research	☐ Research evidence of research
DESIGN - Team worked together with a clear plan and brought their ideas.			
☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan
☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan
CREATE - Team developed a model that is built on or solving one with a prototype that is designed from scratch.			
☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model
☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model
ITERATE - Team presented their ideas with others, collected feedback, and created improvements to their solution.			
☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback
☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback
COMMUNICATE - Team presented a clear explanation of their solution, the design process, and how their team worked together.			
☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication
☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication

If the team is a candidate for one of these awards, please tick the appropriate box. Check only your own perspective unless indicated otherwise on the award sheet.

Feedback - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Robot Design - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Robot Design - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Robot Design

First LEGO League Challenge

Team Name: _____ Judging Room: _____

Instructions
Teams should communicate to the judges their achievement in each of the following criteria. The rubric should be filled out according to the Robot Design presentation.
Judges are required to tick the box for each separate criterion to indicate the level the team has achieved. If the team EXCEEDS, a short comment in the EXCEEDS column is required.

BEGINNING 1	DEVELOPING 2	ACCOMPLISHED 3	EXCEEDS 4
IDENTIFY - Team identified a clearly defined problem that was well researched.			
☐ Problem definition of the problem	☐ Problem definition of the problem	☐ Problem definition of the problem	☐ Problem definition of the problem
☐ Research evidence of research	☐ Research evidence of research	☐ Research evidence of research	☐ Research evidence of research
DESIGN - Team members worked collaboratively on their design and developed for building and coding skills needed.			
☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan
☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan	☐ Design evidence of plan
CREATE - Team developed a model that is built on or solving one with a prototype that is designed from scratch.			
☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model
☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model	☐ Model evidence of model
ITERATE - Team presented their ideas with others, collected feedback, and created improvements to their solution.			
☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback
☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback	☐ Feedback evidence of feedback
COMMUNICATE - Team effectively explained what they learned from the robot design process and explained their progress.			
☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication
☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication	☐ Communication evidence of communication

If the team is a candidate for one of these awards, please tick the appropriate box. Check only your own perspective unless indicated otherwise on the award sheet.

Feedback - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Robot Design - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Robot Design - Award that recognizes achievement in the confidence and capability of the team and the award is given to the team.

Note:

Class Packs may use the Class Pack rubric instead of these team 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' Core Values will be evaluated during the judging session while they share about their innovation project and robot design.

Teams will also be scored on their Gracious Professionalism at every robot game match.



Download Rubrics



→ **In this session
the team will . . .**

- ☐ Code their robot and test their mission strategy.
- ☐ Iterate and improve their innovation project solution based on testing and feedback.

Session 9

→ **Tips**

- 1 Examples recorded here could be used for the innovation project presentation or robot design explanation.
- 2 The team should develop a clear strategy for which programs to run and the order in which to run them during the robot game.
- 3 The team should also have a backup of their programs on an external drive like a USB stick or online storage.
- 4 The reflection questions should be discussed together so the team is able to authentically describe their journey to the judges.
- 5 Core Values are evaluated throughout the judging session while teams present on their innovation project and robot design. Review the rubrics to learn which criteria count toward the team's Core Values score.

→ **Introduction**

- 1 ☐ Think about impact and share examples of how your team has had a positive influence on you and others.

→ **Tasks**

- 2 ☐ Think about your robot mission strategy on the mat and the missions you will solve.
- 3 ☐ Continue to practice missions.
- ☐ Iterate and improve your robot and innovation project solutions.
- ☐ Discuss the reflection questions and record your progress.

→ **Clean Up**

→ **Reflection Questions**

- How will your team demonstrate Core Values at the event?
- How will your team explain what is innovative about your project to judges?
- What changes have you made to your innovation project and robot design based on feedback and testing?

5 **Tip**

Your team's Core Values are evaluated using the robot design and innovation project rubrics. Visit page 3 to see all Core Values listed.

Session 9

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

Our notes:

Session 10

→ In this session the team will . . .

- ☐ Iterate and improve their innovation project solution based on testing and feedback.
- ☐ Code their robot and test their event mission strategy in a 2.5-minute match.

Session 10

Coopertition®: Teams help and cooperate with each other, even as they compete.

Our notes:

→ Introduction

- ☐ Talk about *Coopertition®* and the ways your team will demonstrate it when competing with other teams.

→ Tasks

- 1 ☐ Look at the innovation project rubric for what to include in your five-minute presentation. Plan your project presentation by writing an outline or script.
- 2 ☐ Create any visual displays you need. Engaging your audience can help ensure they remember your key points.
- 3 ☐ Continue to create, test, and iterate on your robot solution.
- 4 ☐ Continue practicing 2.5-minute robot games with all the missions you have worked on.
- 5 ☐ Discuss the reflection questions and record your progress.

→ Clean Up

→ Reflection Questions

- How will you know if your solution is going to make a positive impact on others?
- What is your team most proud of in your work on the project and robot design?
- What skills have you developed throughout your *FIRST* LEGO League experience?

Tip

Create an outline to make sure you are sharing what the judges need to hear. Look at the rubrics and the judging session flowchart for support.

→ Tips

- 1 Provide the team with the innovation project rubric.
- 2 The presentation can have a slideshow, poster, play, or even a skit. Props can be used, such as costumes, shirts, or hats. Make sure teams have a drawing or model that represents their solution to show to judges.
- 3 The team can use a script for their judging session presentation. Provide copies for each team member.
- 4 The team might need more space to store all their materials for the presentation.
- 5 Use the scoresheet at the end of each 2.5-minute match so the team knows their score.

→ **In this session
the team will . . .**

- ☐ Finalize their live innovation project presentation.
- ☐ Finalize their robot for the robot game and prepare their robot design explanation.

→ **Tips**

- 1 Provide the team with the robot design rubric.
- 2 Have the team reflect on their progress and complete the final section of the Team Progress sheet on page 8 of the *Engineering Notebook*.
- 3 Build team confidence by having them practice communicating their innovation project and robot design solutions.
- 4 Every team member should participate in the presentation at the judging session. If the team needs any accommodations, contact the organizer of the event.
- 5 As part of their mission strategy, the team should know who will run the robot during the matches.

Session 11

→ **Introduction**

- ☐ Talk about how your team has had fun while exploring the season theme and share examples of how your team has celebrated your hard work.
- ☐ Complete the "Event Time" section of the Team Progress sheet on page 8.

→ **Tasks**

- 1 ☐ Look at the robot design rubric to learn about what to include in your five-minute explanation.
- 3 ☐ Plan your robot design explanation by creating an outline or script.
- ☐ Make sure to share how each member of the team contributed to the project and robot design.
- 4 ☐ Continue to develop and practice your project presentation and collect feedback.
- ☐ Discuss the reflection questions and record your progress.

→ **Clean Up**

→ **Reflection Questions**

- Which parts of your robot show how you used the Engineering Design Process?
- How are everyone's contributions recognized in the presentation?
- How has *FIRST* LEGO League made a difference for you?

Tips

- 🔥 It's important to share the progress your team has made and the lessons you have learned.
- 5 🔥 Plan to talk about your robot design and game strategy without the robot game field.

Session 11

Fun: We enjoy and celebrate what we do!

Our notes:



Session 12

→ In this session the team will . . .

- ☐ Practice their presentation of their innovation project and robot solutions.
- ☐ Run practice robot game matches.

Session 12

Take pride in what you've accomplished this season and enjoy the experience of sharing it with others.

Our notes:

→ Introduction

- 1 ☐ Look at your team's goals listed on page 8. Did you achieve them?
- 1 ☐ Review page 26, Prepare for Your Event, and page 27, Rubrics & Scoresheets.

→ Tasks

- 2 ☐ Rehearse your judging presentation by communicating your innovation project and explaining your robot design.
- 2 ☐ Collect feedback on your presentation from your coach, mentor, or another team.
- 3 ☐ Practice multiple 2.5-minute robot game matches and calculate the points you score.
- 3 ☐ Practice your project presentation and your robot design explanation.
- 3 ☐ Make a list of everything you will need to bring to the event.
- 3 ☐ Discuss the reflection questions and record your progress.

→ Clean Up

→ Reflection Questions

- 4 • What has your team accomplished?
- 4 • What will you do if a mission does not work during a match?
- 4 • What is your plan for having your team's robot attachments ready for the robot game?
- 5 • What else does your team need to work on before the event?

Tip

Continue practicing missions and working on your innovation project leading up to your event!

→ Tips

- 1 Try to split the time in this session equally between practicing the presentation and the robot game matches.
- 2 Encourage the team to practice their presentation before the event. They can practice by sharing their solutions with others. The judging session flowchart tells you how much time is allowed for the presentation.
- 3 Have the team run their 2.5-minute robot matches. Make sure they practice running their programs in the right order.
- 4 The team should have a contingency plan for if things don't go as planned during the robot game. They could identify other missions to run.
- 5 Remind the team about the Core Values and how they will demonstrate them throughout the event, including at every robot game match.

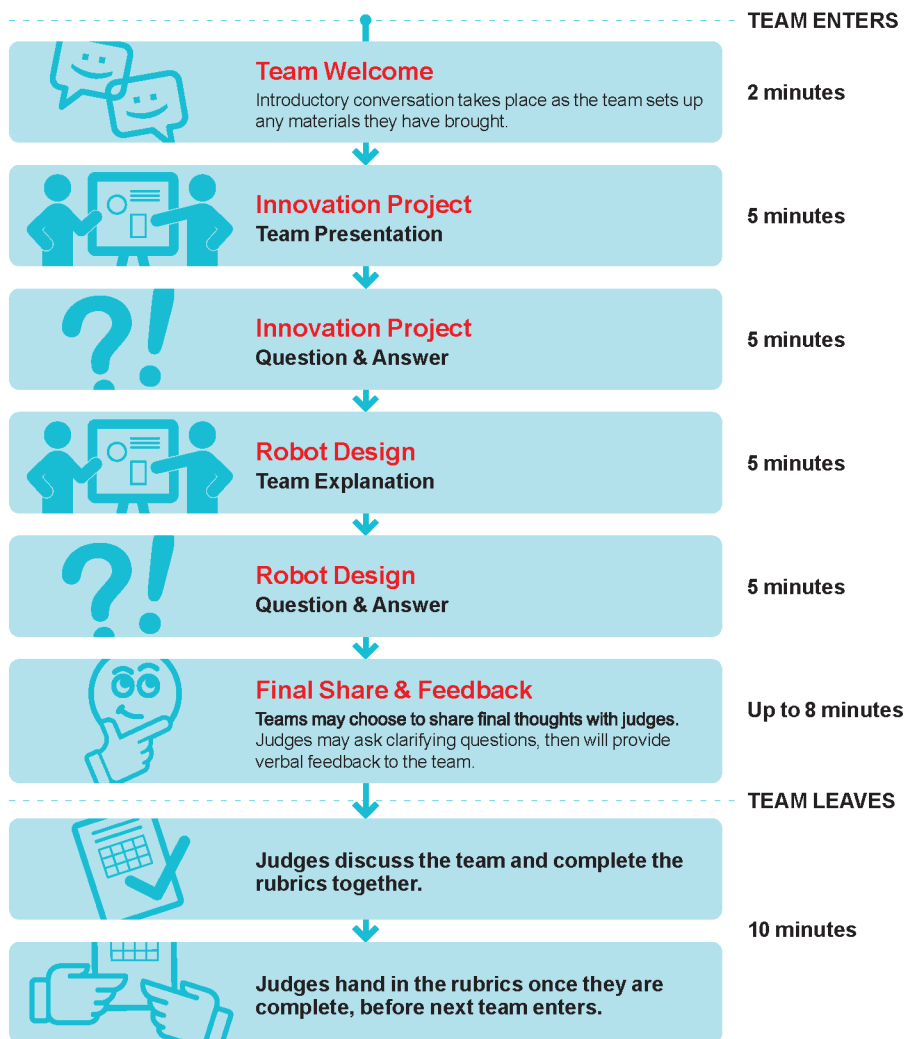
Prepare for the Event



Judging Session Flowchart

During judging, team members will present their innovation project and robot design work. Judges will ask questions to help them score the team's progress according to the rubrics, then give positive and constructive feedback to the team.

Teams should demonstrate **FIRST® Core Values** in everything they do. Judges will be excited to see how teams used **teamwork, discovery, inclusion, innovation, impact,** and **fun** in all aspects of their work.



It's normal to feel like there's still so much to do as your event approaches. The most important thing is to strive to complete as much as possible and come ready to share what you've accomplished so far. Whether it's your robot design, innovation project, or Core Values, your event will give you new ideas and inspiration to keep building on what you've started.

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.

Final Checkpoint



The goal of a *FIRST*® LEGO™ League Challenge event is for the team to celebrate their hard work, compete to the best of their ability, share what they have learned, and most importantly **have fun**! Below are some helpful steps to help your team prepare.

- ☐ Determine what type of event you're attending and identify the organizer. If you purchased a Class Pack, the event will be your responsibility. Check out the ***Class Pack Guide*** for more details.
- ☐ Confirm the start and end time of the event. Make travel arrangements for the team and encourage families and caregivers to attend, if possible.
- ☐ Review the details and requirements for the event. They can vary depending on the type of event.
- ☐ Ensure each team member can contribute to explaining their work according to the **rubrics**. You could also practice presenting your work with an adult or another team for feedback.
- ☐ Have the team prepare a **checklist of materials** that are needed for the event, including your robot and attachments, innovation project materials, and any scripts or robot programming notes.
- ☐ Take a moment to reflect, celebrate how far you've come, and get excited to share your progress. Every team starts somewhere, and your event is a chance to grow, learn, and have fun!
- ☐ Remind the team that *FIRST* LEGO League is about the process of learning, experimenting, and improving. Participating in the event is an important step in this process.
- ☐ At the event, encourage the team to engage with other teams to share what they have learned and to support each other.

Beyond *FIRST*® LEGO® League

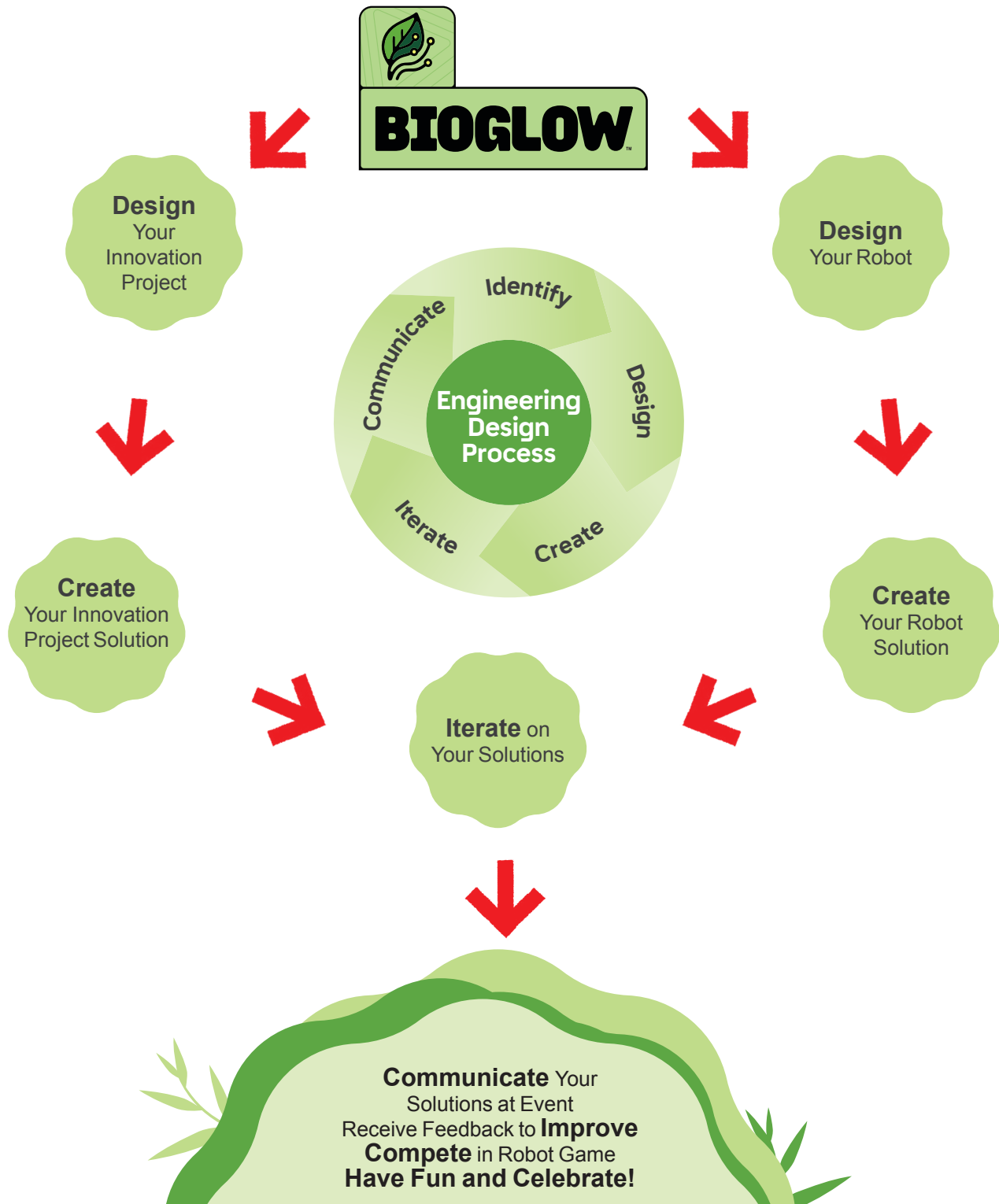
Connect with a *FIRST*® Tech Challenge or *FIRST*® Robotics Competition team so that your Challenge team can see how they can continue their *FIRST* experience in the future.



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

- ☐ Hold a team celebration!
- ☐ Have the team share their experience with friends and classmates.
- ☐ Have the team continue developing their innovation project.
- ☐ Discuss your rubric scores and feedback received.
- ☐ 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.

Team Journey



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