MODULE 1

INTRODUCING CORE VALUES AND TEAMWORK SKILLS

MODULE OVERVIEW

MODULE NUMBER: 1

DURATION: 3 hours

Core Values to Focus on in This Module

- We are a team.
- We do the work to find solutions with guidance from our Coaches and Mentors.
- We know our coaches and mentors don't have all the answers; we learn together.
- We honor the spirit of friendly competition.
- What we discover is more important than what we win.
- We share our experiences with others.
- We display Gracious Professionalism® and Coopertition® in everything we do.
- We have FUN!

SUMMARY

In Week 1, you will introduce the *FIRST*® LEGO® League Core Values to your team. *FIRST* LEGO League is more than robots!
The *FIRST* LEGO League Core Values are the cornerstones of the program. They are among the fundamental elements that distinguish *FIRST* LEGO League from other programs of its kind. By embracing the Core Values, participants learn that friendly competition and mutual gain are not separate goals, and that helping one another is the foundation of teamwork.

OUTCOMES:

Educational standards alignments can be found at
https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST* LEGO League Challenge Set
2. Paper
3. Pencil/Pens/whiteboard markers
4. Whiteboard or other writing surface
5. 2 Tokens per team member (pennies or any small item will do)
6. Printed Field Research handouts

Note from An Experienced Coach:

Imagine ten excited kids ranging from 4th to 8th grade trying to agree on a team name. Suggested names include technical, silly, super heroes, video games, pop culture references, favorite foods, acronyms, military weapons, etc. The team scribe scrambles to write down the suggestions and after everyone has submitted at least one suggestion the coach facilitates a vote.

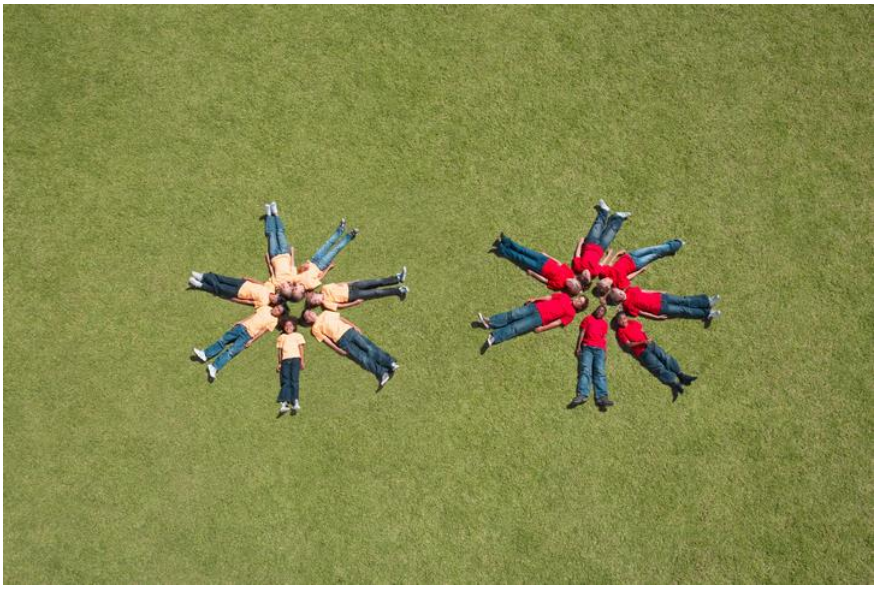
Kids are limited to voting only once per round. The scribe reads out the names one at a time and the vote is tallied. No winner. Lowest vote getters are eliminated and another round of voting ensues. After four rounds there are only two names left. A 5-5 deadlock. Someone suggests taking part of one name and combining it with part of the other. A vote is held and the hybrid name receives 9 votes. The scribe is last to vote and says, "I don't really like the name but if everyone else is happy I'll vote for it to make it unanimous."

The Flaming Marshmallows are now entering their sixth season and have won multiple Core Value and technical awards at State Championships. They participate, brainstorm, cooperate, compromise, and unite to strengthen the team and advance toward their goals. The naming of a team is an early opportunity to set the tone for the season and to reinforce Core Values which are new to kids and coaches alike.

INSPIRATION

Begin by showing your team the *FIRST*® LEGO® League is…. video at:
https://youtu.be/FZsvSVz673g

Read over the eight Core Values with your team.
You might read them to the team, or take turns reading them aloud, depending on the ages of your members.



- We are a team.
- We do the work to find solutions with guidance from our coaches and mentors.
- We know our coaches and mentors don't have all the answers; we learn together.
- We honor the spirit of friendly competition.
- What we discover is more important than what we win.
- We share our experiences with others.
- We display Gracious Professionalism® and Coopertition® in everything we do.
- We have FUN!

It is important that the team understands each of the Core Values. Talk about them briefly, and ask the kids what they think it means. You will want your team to apply these Core Values throughout the season. In each module, you will focus on a different Core Value and explore it in greater depth.

INSPIRATION SUGGESTED TIME: 25 minutes

Lost at Sea

Teamwork challenges are a great way to help your team members learn how to problem solve and work together. They are also a lot of fun! This teamwork challenge will help you discuss the first Core Value in greater depth, "We are a team."

Materials Needed

1. Paper
2. Pens or pencils

Activity
Your team is shipwrecked and stranded in a lifeboat. Write down five items you want to have with you in order of importance. You have 10 minutes to complete the list. Go!

HINT:
You can adjust the difficulty of the activity by increasing or decreasing the time limit and the number of items they may choose. For more advanced students, increase the time limit and number of items.

Recap

After they have completed the task, talk about how it went. Ask the team questions like:

1. How did you narrow your list down to five items? Did you begin by brainstorming a list of everyone's ideas?
2. How did you decide the ranking of each item?
3. Did you have disagreements? If so, how did you deal with them?

HINT:
When facilitating a discussion with kids, it can be helpful to have ground rules. You might:

- Ask questions of the whole group and let them speak freely.
- Call on individual students to answer.
- Have students raise their hands before you call on them.
- Use a "talking stick" or other item that gets passed around the circle. You can only speak when you have the talking stick in your hand.

Whatever method you choose, make sure you set clear expectations for the students.

This is an opportunity to talk about brainstorming and decision-making as a group. Talk about how the team will have to make many decisions in the coming weeks. They will be working together to build a robot, program it to accomplish missions, conduct research, and come up with innovative solutions. Along the way, they will have to make decisions about how all of this will be accomplished. How will they make group decisions? They might:

1. Take a vote.
2. Try multiple ideas to see which one works better.
3. Combine ideas, or take the best parts from each idea.
4. What other ways can your team think of?

You might come up with a formal decision-making process that your team will follow throughout the season. Or, you might talk about different ways to make decisions based on each situation.

INNOVATION PROJECT

SUGGESTED TIME: 30 minutes

1. Read about the Innovation Project parameters in the Challenge as a team.
The most important thing you can do in the first week is to read the rules! Teams who read the rules have more fun and know what to expect throughout the season. The rules can be found in the *FIRST*® LEGO® League Challenge materials.

2. Discuss the Innovation Project
Ask each team member:

1. What do you find most interesting about the project?
2. What do you already know about this topic?
3. Share a personal story you have had with the Project theme.

LEARNING RESOURCES

The *FIRST* website is your go-to resource for all things *FIRST* LEGO League. You will want to be sure everyone knows where the Challenge and other important documents can be found. Innovation Project and Robot Game Updates will be issued throughout the season. Questions are clarified, rules are explained, and new Challenge information is distributed in the Updates. Be sure team members know where to check for Challenge Updates, so everyone can stay up-to-the-minute on the latest season developments.

www.firstinspires.org/robotics/fll/challenge-and-season-info

HINT:
Assign a different team member each week to check for updates. Or, have one team member responsible for checking Innovation Project Updates and another for checking Robot Game Updates, and report back to the team each week. Coach, you will want to regularly check the updates, too!

Some other helpful resources:

- The *FIRST* LEGO League Q&A Forum:
  https://forums.firstinspires.org/forum/general-discussions/first-programs/first-lego-league
- Your state or regional FIRST LEGO League organization:
  http://www.firstinspires.org/find-local-support

ROBOT

SUGGESTED TIME: 90 minutes

1. Build a basic.
Build a basic robot, and that will give your team a good starting point for attempting missions.

2. Read the Robot Game Rules and Missions.
Again, it is very important to know the rules! Read the Robot Game Rules and the Missions in the Challenge materials. You will want to read these more than once. Have the team read them at home again with a parent, older sibling, or other caregiver. You can also watch the official game video, but explain that this is NOT a substitution for reading the rules.

3. Evaluate the field and decide on target missions.

Now you can begin to talk about the missions!

- Make sure each team member understands what needs to be accomplished for each mission.
- Make a chart or list to show how many points each mission can earn.
- Begin to think about strategy and choosing a few missions that the team will attempt.
- Ask the students questions to stimulate their thinking about scoring and strategy.
    - Which missions are located near each other on the table?
    - Which missions could be grouped together for maximum points?
    - Which missions are located near home?
    - Which missions have similar mechanisms?
    - What is the difficulty level of each mission? Do you want to aim for more missions that are easier to accomplish, or attempt a harder mission that results in higher points? Have the team calculate their score based on different scenarios.
- Perform the Technic Beam test (http://www.3dcontentcentral.com/ShowModels/ContentCentral/Lego_Technic_M_Beams/Lego_Technic_M_Beams.JPG). It is easy to over-engineer a solution to a mission, but often the solution is as simple as using a Technic Beam to push, pull, or poke the necessary mission pieces.
    - Have the team gather around the game table.
    - Give one student a technic beam.
    - Ask them to choose a mission and see if it can be accomplished by hand simply by using the technic beam.
    - Then hand the beam to another student and repeat with a different mission, until all the missions have been tested.
- Decide which missions you want to tackle. It's okay to choose one to three missions to begin. Be sure to implement the decision-making process the team agreed upon earlier.

LEARNING RESOURCES

- EV3Lessons Basic Building Instructions - EV3Lessons contains instructions for building other robots if you choose to build one different than the standard EV3 instructions.

DEBRIEF

SUGGESTED TIME: 15 mins

1. Make a timeline

- Using a whiteboard or flip chart, have the team list all of the tasks the team needs to accomplish by competition.
- Then write the date of the team's first competition.
- Have the team assign due dates for each task between now and competition.

HINT:
Have the team reference the timeline at the end of every practice to make sure they stay on track.

2. Recap what the team accomplished in this practice. The team:

- Learned to work together through the Shipwreck activity.
- Read and discussed the Challenge.
- Built a basic robot.
- Created a season timeline.

3. Gather the team and ask each member to share something they learned.

4. Give the students the Field Research for this week.

Team members in *FIRST*® LEGO® League must solve complex, real world problems! Therefore, not everything can be completed during practice. Students must go out into the world and explore the topics on their own. Each week team members will be given a Field Research Handout to complete on their own and bring to the next practice. Research may include talking to adults and recording their expertise on the Innovation Project topic, brainstorming ideas for the Robot Game, and more.

FIELD RESEARCH

Before the next module, team members should:

- **Read the Challenge materials again.** Have team members read the Challenge with a parent, older sibling, or other caregiver, especially for younger teams. Everyone should read the Challenge materials several times.
- **Complete the Field Research Handout with the following tasks on it:**
  - Innovation Project
    - Write something they currently know about the Challenge theme.
    - Write something they would like to know about the Challenge theme.
  - Robot
    - Pick two missions the team has decided to attempt and draw a picture or write a description of how the missions can be accomplished.

OTHER TASKS & TIPS

TASKS

Invite Students to Join Team in STIMS

1. Create an account in the Team Registration System if you haven't already done so.
2. From your team page, invite team members to join.
3. Parents will receive an email inviting their child to apply to your team. They will need to follow the directions in the email and create an account in STIMS. Parents will need to know the team number to apply.
4. If anyone cannot or chooses not to register online, have them fill out the paper consent form.
5. After they apply, you will need to go back into your account to confirm that all of your team members are officially registered with *FIRST*®, and **accept** them:
6. Using your *FIRST*® username and password, log into the Team Registration System. This should bring you to your *FIRST*® LEGO® League Dashboard.
    1. Click on the Team Summary button for your team. This will take you to the Team Summary page.

2. Scroll down to the Team Roster section of the summary, then click on the "Edit/View" button on the Youth Team Members row to see a list of team members and their current status.
3. You must click on the Accept button to add the student to your team.
4. Be sure each team member's Consent Form Status is Complete.
5. If any of your team members are not listed, remind parents to register their child.
6. If any of your team members have not accepted the consent form, be sure the parent goes back into their STIMS account and accepts the Consent Form. If the parent cannot access STIMS or chooses not to register online, you will need to obtain a completed and signed paper copy of the consent form from the team member's parent, and bring that paper copy of the consent form to all *FIRST* LEGO League events in which that team member participates.

7. Does your school or organization have any additional consent or release forms that need to be signed? Check this off your list in Week One.

TIPS

Consider making a team expectations contract.

It can be hard to anticipate everything that will come up during the *FIRST* LEGO League season. Some coaches find that having a team contract helps to relay expectations up front and avoid difficult conflicts later in the season. You might include things like exhibiting Gracious Professionalism® or attending a minimum number of practices. Or, involve the kids! Ask the team what they think and make this a teamwork activity in one of your early practices.

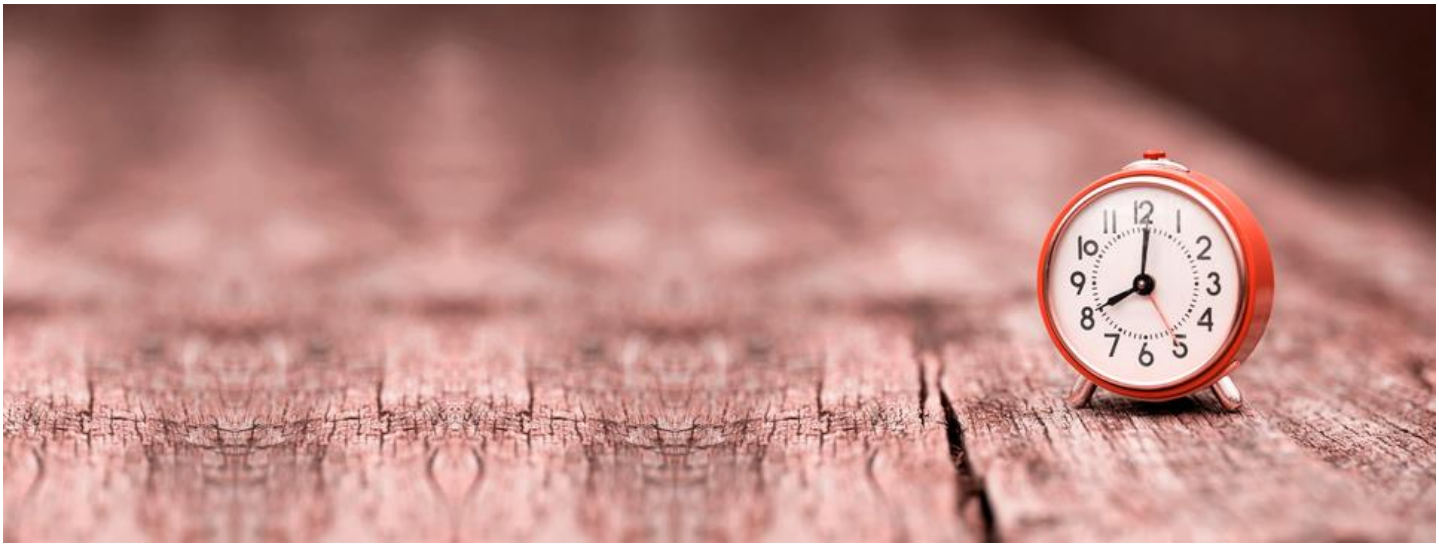
Be sure parents know what to expect, too.

Parents will appreciate knowing as much information as possible before they commit. Compose a parent letter explaining how often you will meet, any associated costs (including possible travel), and what level of commitment is required. Also, this is your chance to elicit help! Ask for specific tasks from parents and you will be more likely to get volunteers. You might ask parents to take on certain tasks such as:

1. **T-shirts**: At competitions, some teams choose to wear team t-shirts, but it is NOT required. If your team is attending an event, they may want to create t-shirts. You can make t-shirts with fabric paints, design a t-shirt to be printed, or pick a team color for everyone to wear on tournament day. If you decide to make t-shirts, you will be glad if you can get a parent or other helper to take on this task from start to finish. Have the parent come to a meeting, help the kids design the shirt, and figure out all of the logistics of collecting t-shirt sizes, ordering, printing, and collecting payment. However, again, t-shirts are not required and many teams find other fun ways to demonstrate their team spirit.
2. **Tournament chaperone**: Having an extra adult or two on tournament day will benefit everyone. You can focus on the team's activities while the other adults worry about lunch, finding judging rooms, and general team management.
3. **Fundraising**: Ask a parent to approach sponsors or plan a fundraiser with the team. Involve the kids in all of the planning, from idea generation to implementation. This can also be a fun, team-building experience.

NEXT TIME

In the next module, *Researching and Programming Basics*, the team will begin to think critically about the Challenge topic and learn to make the robot perform basic functions.



Remember that instruction builds on itself. Everything you do and talk about in this module is building context for the next module. And every module is building context for the competition where students will compete and present what they've learned. In order to *begin with the end in mind* in each module, you'll need to know what's happening next time and keep it in mind as you move your team through each module -this helps you steer the learning in the right direction. Make sure that before you come to the next meeting you have reviewed *Module 2: Researching and Programming Basics* thoroughly.

Field Research

Module 1

1. Be sure to read the Challenge materials again! Read the Challenge with a parent, older sibling, or other caregiver.
2. Answer the questions below. Project

    1. Write something you know about the Challenge theme.

    2. Write something you would like to know about the Challenge theme.

    Robot

    1. Pick two missions the team has decided to attempt and draw a picture or write a description of how the missions can be accomplished.

MODULE 2

RESEARCHING AND PROGRAMMING BASICS

MODULE OVERVIEW

MODULE NUMBER: 2

DURATION: 2.5 hours

Core Values to Focus on in This Module

- We do the work to find solutions with guidance from our Coaches and Mentors.

SUMMARY

In Week 2 the team will begin the design process for both the Innovation Project and the Robot Game. They will explore and research the Project and learn how to make the robot perform basic functions with introductory programming concepts.

OUTCOMES:

Educational standards alignments can be found at
https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST*® LEGO® League Robot Set
2. *FIRST* LEGO League Challenge Set
3. Whiteboard or other writing surface
4. Sticky notes
5. Pencil/Pens/whiteboard markers
6. Computer or tablet to program the robot
7. 2 Tokens per team member (pennies or any small item will do)
8. Printed Field Research handouts

Note from An Experienced Coach:

Mission planning is best done using visual and tactile activities around the table. Post-it notes and mission planning cards work great. Keep in mind 2.5 minutes goes by fast and you need to build in time for trips back to home. Start small and focus on missions that can be completed with consistency.
The Project can be overwhelming for young teams because there are so many great ideas. At first, focus on the problem and ignore solution discussion. The biggest tip is to walk the team through the Project rubric. It clearly explains what to focus on for the Project. Line up experts early. Most importantly, do not forget to share your Project!

Scott Rakestraw
Coach, VA-DC Judge Advisor and Founder of StartingPoints.com, useful technology for *FIRST* LEGO League teams.

Capital Teens

INSPIRATION

SUGGESTED TIME: 15 minutes

The teamwork exercise for this module is called Name the Team! The team's name becomes part of the team's identity. Many teams pick a name that will be used for more than one year. If your team's name will be used for more than the current season, the team should be careful to avoid an identity based on this season's challenge.

Brainstorming a Name

1. Begin by giving each student a stack of sticky notes and a pen or pencil.
2. Give the students the rules of the brainstorming game:
    1. You have five minutes to write as many name ideas as you can (one per sticky note) and place them on a board or wall.
    2. All ideas are valuable in brainstorming (even silly ones).
    3. We do not make fun of anyone else's idea. Even a crazy idea may spark inspiration for another idea.

HINT: Some teams like to look at the names that other teams have chosen to help them get ideas about what kinds of names they might like.

HINT: Monitor the activity and make suggestions to the team about being inclusive and listening to all ideas if the team seems to be excluding individuals, or individuals aren't participating, but let the kids come up with the ideas, record the ideas, and decide how to organize/prioritize or even keep/discard the ideas. A younger team may need more guidance and hands-on facilitation from the coach in this first brainstorming activity to help build a foundation for more self-directed brainstorming in the future.

Narrow the Choices

1. Reinforce this session's Core Value (We do the work to find solutions with guidance from our Coaches and Mentors) by reminding the team that this is their name and they get to choose!
2. Have the students narrow the choices by:
    1. Remove duplicate names (leave at least one of course!).
    2. Have each student tell the group their favorite name and why.
    3. Remove names that were not mentioned by any team member.
3. Finally, choose the official name! You might:
    1. Vote on it:
        1. Give every team member 3 tokens (tokens can be anything from pennies to paper clips).
        2. Ask team members to vote for their favorite team names. How they use the tokens is up to them - for example, they can put all 3 tokens on one name, or they can spread the tokens out to their top 3 choices.
        3. The team name with the most tokens wins! If there is a tie, choose the most popular names and re-vote. If everyone votes for their own, re-vote and no one can vote for their own.
    2. Use your team's decision-making strategy.

HINT: There are many ways to get the work done. Some teams will divide into groups to work on the day's Innovation Project and Robot tasks. If you do this, you might want to vary the groups so that students have a wide range of experience working with different people. You can change the groups every practice or every week. Writing down who is in each group will help you remember.

INNOVATION PROJECT

SUGGESTED TIME: 45 minutes

1. Discuss the Field Research from the Last Module

Have each student share their responses to the two Field Research questions.

1. What is something you know about the Challenge theme?
2. What is something you would like to know about the Challenge theme?

HINT:
Many successful teams pick a problem that has some sort of personal connection they can get excited about. As a coach, you might think one problem is a better choice, but be sure the kids choose something they are excited about and that will maintain interest throughout the season.

2. Now it's time to research!

1. Make sure everyone understands the parameters of the theme and any exceptions to the problem you can choose.

   HINT:
   Remember, the parameters are outlined in the Challenge materials.

2. Begin research on the theme.
   1. Each year's challenge will include a starting point for your research. Begin with this activity.
   2. Find out how the Challenge theme affects your local community.
   3. Do general research on the Challenge theme.
   4. Use these resources for information:
      1. Internet
      2. Books or magazines from the library
      3. Current events
      4. Personal stories the kids shared in the last module

HINT:
As you research the Challenge theme, keep an eye out for related problems that scientists and engineers are working on in the world today.

LEARNING RESOURCES

- Design Process Video - This is a very accessible (made by kids, for kids) description of the process your team will use throughout the season.
  https://youtu.be/uTyfJK-bNfY

ROBOT

SUGGESTED TIME: 60 minutes

1. Blindfolded programming activity

1. Ask for two volunteers. One person will be the "robot", and the other person will be the "programmer."
2. Blindfold the robot.
3. Place a cup on a table on the other side of the room.
4. The programmer must give instructions to the robot to walk across the room and pick up the cup. Be sure they tell the robot every step or movement to take to complete the task.

HINT:
Depending on the size of your group, you may have students pair up and each pair complete this activity.

2. Discussion

Ask the students questions about the activity.

1. What happened when the programmer told the robot to walk forward?
2. How does the robot know how far to go or when to stop?
3. How specific did the instructions have to be?

This game helps teach the team the importance of clearly and exactly communicating what the robot must do. Make sure the team understands how this game relates to programming for the *FIRST*® LEGO® League robot game. Having the robot teammate blindfolded prevents them from offering help or using their own initiative to navigate obstacles - just like the EV3 robot will only do what it is programmed to do.

3. Master basic programming skills by completing the challenges below. Make your robot:

1. Move forward
2. Move backward
3. Make a 90 degree turn to the right and left

HINT:
Make sure each team member gets to control the keyboard and mouse while going through the programming tutorials.

LEARNING RESOURCES

- EV3 Robot Educator Basics Tutorials
- EV3Lessons.com: http://ev3lessons.com/

DEBRIEF

SUGGESTED TIME: 10 mins

1. Check the Timeline

1. Have the team check the timeline they created last practice.
2. If they are on schedule, congratulate them!
3. If they are a little behind, ask them what they can do to catch up.

2. Recap

Review what the team accomplished. The team:

1. Decided on a team name.
2. Began the design process by researching the Challenge theme.
3. Learned how to write basic robot programs.

3. Reflect

Ask the team:

1. What interesting thing they found when researching the Challenge theme?
2. How they felt about programming the robot? Was it easy? Hard?
3. What should we do when we run into hard problems?

4. Give the students the Field Research for this week.

FIELD RESEARCH

Before the next module, team members should use the attached handout to do the following activities:

Innovation Project

- Find and bring one magazine article and one internet source related to the Challenge theme to share with the team.

Robot

- With a parent or caregiver, look up and watch two YouTube videos of *FIRST*® LEGO® League teams from previous seasons.
- Write down three things you learned from the videos.

NEXT TIME

In the next module, the team will begin to think critically about the Challenge topic and brainstorming solutions to the Robot Game Missions.

Make sure that before you come to the next meeting you have reviewed *Module 3* thoroughly.

Field Research

Module 2

Innovation Project

1. Find and bring one magazine article and one internet source related to the Challenge theme to share with the team.

Robot

1. With a parent or caregiver, look up and watch two YouTube videos of *FIRST*® LEGO® League teams from previous seasons.
2. Write down three things you learned from the videos.

    1.

    2.

    3.

MODULE 3

NARROWING THE PROBLEM AND DESIGNING THE ROBOT

MODULE OVERVIEW

MODULE NUMBER: 3

DURATION: 1.5 hours

Core Values to Focus on in This Module

- We know our Coaches and Mentors don't have all the answers; we learn together.

SUMMARY

In Week 3 the team will brainstorm a list of problems related to the Challenge theme they might want to explore for their Innovation Project. They will narrow this list and begin researching the problems. The team will also plan how they will solve the Robot Game missions and design any attachments or changes that need to be made to the robot.

OUTCOMES:

Educational standards alignments can be found at
https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST*® LEGO® League Challenge Set
2. Whiteboard or other writing surface
3. Pencil/Pens/whiteboard markers
4. Computer or tablet to program the robot
5. Newspaper
6. Masking Tape
7. Book (can be anything)
8. Cardboard (approx. 8.5"x11")
9. Printed Field Research handouts

Note from An Experienced Coach:

By Module 3, you have brought your team together, introduced the Core Values to them, and started them on their way learning about the Project and the Robot. A lot of work lies ahead, but be sure to take some satisfaction from what you have accomplished so far. At this point the team's dynamics, both good and bad, are becoming clear. Congratulate the team on what is working in their interactions with each other, and strategize on what you might do to help the team adjust their behavior to reduce conflicts or increase performance. Use the Core Values where appropriate to encourage the team. If you see the team getting stuck on particular technical issues, consider seeking help from a parent or other source to resolve the problem Remember that FLL team coaches are supposed to have fun, too!	Capital Teens

INSPIRATION

SUGGESTED TIME: 15 minutes

Paper Table Challenge

The teamwork exercise for this week is an activity created by the PBS Design Squad. In the Paper Table Challenge, team members must use newspaper and masking tape to build a small table strong enough to hold a book. See the instructions here.

Discuss the Core Value

This week's Core Value is: We know our Coaches and Mentors don't have all the answers; we learn together.
Discuss this idea with your team. Ask them questions such as:

1. How did you see this week's Core Value in the activity?
2. How will this Core Value be relevant when building the robot?
3. How will this Core Value be relevant in the Innovation Project?
4. Is there only one right answer?
5. What do we do when we don't know the answers?
    - What did you do in the activity?
    - Did you try different approaches?

HINT:
There is NEVER only one right answer!

INNOVATION PROJECT

SUGGESTED TIME: 30 minutes

Identifying Problems

This week the team will brainstorm problems associated with the Challenge and then narrow the list to a handful of problems they might want to explore.

1. Before beginning the brainstorming session, remind the team of the brainstorming guidelines used previously:
    1. No idea is a bad idea.
    2. Throw out any and every idea that pops into your head. Even a crazy idea might lead to something else (or it might not be as crazy as you thought!).
    3. Keep a list of all the ideas.
2. Once the team has generated a list of problems, help them narrow the list down to the number of members on your team (if you have 5 kids, narrow the list to 5 problems).
3. Have each team member pick their favorite problem, or have everyone choose a problem out of a hat.
4. Each team member will perform research around their problem for this week's Field Research.

Professional Pre-Work

If possible, interviewing professionals can be very helpful for learning about the Challenge. It helps kids envision their future jobs by exposing them to professionals and allows them to gain real world knowledge of the Challenge. Help the kids identify people in their community who know something about the topic and create relevant questions to ask them.

1. Ask the students what kind of jobs are related to the problems they brainstormed.
2. Make a list of these professional jobs.
3. Then ask the students if they know any adults who work in these jobs.
    - Keep a list of the people.
    - If the students don't know anyone personally, ask them to think of local businesses they could contact.
4. Have the students create a list of 5 questions for the professionals. When creating their questions, have them think about:

1. What do we currently know about this topic?
2. What do we need to know about this topic?
3. What are problems related to the topic?
4. What is currently being done about these problems?

LEARNING RESOURCES

- *FIRST*® LEGO® League How-to: What is the Project? Video https://www.youtube.com/watch?v=r229WGU_zbA
- *FIRST*® LEGO® League How-to: How to Have a Successful Project Experience Video https://www.youtube.com/watch?v=pJae_UWamr8

ROBOT

SUGGESTED TIME: 60 minutes

1. Brainstorm ideas for how to accomplish each mission

In module one the team decided on the missions they are going to tackle. Now it's time to start building solutions! It's okay if the team doesn't have all the answers at first. However, the team can start to generate *ideas* about how the missions might be accomplished, which they will then use to guide their attempts to build and program the robot. It's best to keep things simple, and if your team only has time to build and program one mission, that is a success!

As a coach, you can facilitate the development of these ideas by asking questions like:

- Which missions are close to each other on the field?
- Are there any missions where an attachment might be useful?

	**HINT:** Attachments are extensions you build out of LEGO® elements and add to the robot to perform specific actions. For example, you might use a beam to push or pull a feature on a mission model. Attachments do not have to be motorized, but you may choose to use small motors to make them move.
	**HINT:** Your team will be able to add or remove attachment when the robot is in home during a match.

- Which missions require the same action, and therefore might be able to use the same attachment?
- Are there any clues the robot can use to help it find its way around?

	**HINT:** Later we will talk about using sensors and other strategies for accomplishing this.

2. Create a mission plan

After brainstorming ideas, the next step is to create a mission plan. Have your team use the Mission Planning Guide (attached at the bottom of the page) to create a step-by-step list of actions the robot must perform for the mission(s).

HINT:
Remember the blindfold activity! Robots can't think and will only do exactly what you tell them to do. So be specific!

HINT:
Many teams post videos of their robots on YouTube. Watching these videos may spark a few ideas!

3. Decide on a robot design

When deciding what your final robot design will be, you can:

1. Use the basic robot you built in week 1.
2. Search online for ideas.

HINT:
EV3Lessons.com provides instructions for building 3 different robots. These may spark ideas or provide a starting point for your team's robot.

Or create your own! You are going to make the robot your own by adding attachments and altering the robot for your needs as the season goes on.

DEBRIEF

SUGGESTED TIME: 10 mins

1. Check the Timeline

1. Have the team check the timeline they created last module.
2. If they are on schedule, congratulate them!
3. If they are a little behind, ask them what they can do to catch up.

2. Recap

Review what the team accomplished. The team:

1. Completed the Paper Table Challenge.
2. Brainstormed and identified problems related to the Challenge.
3. Decided on a robot strategy and design.

3. Reflect

Ask the team:

1. What interesting problems they identified related to the Challenge?
2. How did they work together and compromise as a team in the activities?
3. What did they do when they didn't know the answers?

4. Give the students the Field Research for this week.

FIELD RESEARCH

Before the next module, team members should use the attached handout to do the following activities:

Innovation Project

Research the problem you have been assigned and write down:

1. Three interesting facts you learned about your problem.
2. Any solutions that currently exist for this problem and why they aren't working well enough.
3. Three possible ways to improve existing solutions or completely new solutions to the problem to share with the team.

Robot

1. Brainstorm ideas for attachments for a single mission. Draw a picture of what you think the attachment should look like.

Field Research

Module 3

Innovation Project

Research the problem you have been assigned and answer the following questions.
1. What are three interesting facts you learned about your problem?

2. Are there any solutions that currently exist for this problem and why they aren't working well enough?

3. What are three possible ways to improve the existing solutions or what ideas do you have for completely new solutions to the problem?

Robot

1. Brainstorm ideas for attachments for a single mission. Draw a picture below of what you think the attachment should look like.

OTHER TASKS & TIPS

TASKS

Set up interview
Arrange for an interview with one of the professionals identified by the team in the "Professional Pre-Work" section of the module. You may:

1. Ask a professional to come to practice
2. Arrange Skype or phone interview
3. Arrange for the team or a subset of the team to go meet with the professional
4. Arrange email "interview"

Check challenge updates
Challenge updates are continuously released throughout the season. Be sure to check at http://www.firstinspires.org/robotics/fll/challenge-and-season-info

Check roster in Team Registration System
Make sure all of the team members have signed up for the team in the Student Team Information Management System, and accept them to the team.

Consent and release forms
Make sure all of the parents have signed the Consent & Release Form for their student.

TIPS

Discussion Management
If the team talks over each other, try using one of the following approaches:

1. Round Robin Approach: Appoint one leader who goes around the circle listening to each idea one person at a time. The leader helps the group take turns talking.

2. Token Approach: There is one token - anything such as a paperclip or penny - and only the person with the token can talk. Then the token is passed around the team to let everyone share their ideas.

Do No Harm
Don't worry about score. Focus on having fun. Building complex robots like those you may see on YouTube are not for young or rookie teams. Start with a basic robot design and built out from there. You will be surprised by what a basic robot that goes straight can do.

Going Straight
A robot that does not go straight will not be consistent. Once you have a base robot, do a straight drive test. If the robot does not go straight, look at the robot's center of gravity and balance. Going straight is a big deal that is overlooked by young teams.

NEXT TIME

In the next module, the team will conduct a professional interview(s) and identify a single problem for their Innovation Project. They will also begin building attachments for their robot and programming the missions. Make sure that before you come to the next meeting you have reviewed *Module 4* thoroughly.

MODULE 4

IDENTIFYING A PROBLEM AND BUILDING ATTACHMENTS

MODULE OVERVIEW

MODULE NUMBER: 4

DURATION: 2 hours

SUMMARY

In Week 4 the team will narrow down the problems they have explored to a single problem they will research further and design a solution to. They will also conduct an interview with a professional about the Challenge. For the robot, the team will design and build attachments to help the robot complete the game missions.

Core Values to Focus on in This Module

- We honor the spirit of friendly competition.

OUTCOMES:

Educational standards alignments can be found at
https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST*® LEGO® League Challenge Set
2. Whiteboard or other writing surface
3. Pencil/Pens/whiteboard markers
4. Computer or tablet to program the robot
5. 2 Tokens per team member (pennies or any small item will do)
6. Printed Field Research handouts

Note from An Experienced Coach:

A rookie and a veteran player are making suggestions for an attachment to the robot that will manipulate a model on the challenge field but neither is persuading the other. The coach suggests they each build a quick prototype of their idea and share it with the team. They each build their idea and bring it to the table for demonstration. The rookie is not yet familiar with the hundreds of different LEGO pieces so her prototype is not very strong, but it's good enough to get the concept across. The veteran's is robustly built and looks cool, but his doesn't accomplish the task very well.

After the demonstration the veteran builder tells the team he thinks the rookie's idea is better and offers to help her find the right pieces and use good building technique to improve her prototype. In the competition of ideas Coopertition® between teammates is as important as with other teams at a tournament.

Over the past five seasons the Amazing Knights have designed and built a wide variety of attachments from passive to active making use of motors, magnets, cannons, rubber bands and pneumatics to create innovative, high performing robots.

INSPIRATION

SUGGESTED TIME: 15 minutes

Trivia Challenge

If the team has already had good research time/met with an interviewee, they might be able to play a trivia game to test their knowledge. This will help the students review the Innovation Project and encourage teamwork.

1. Divide the team into two groups.
2. The teams will compete to see who can answer the most questions.
3. You will ask them questions about:
    1. The problem they have researched.
    2. The interview with the professional.
4. Here are the rules:
    1. Groups will alternate being asked questions.
    2. One representative is chosen to answer each question. Every group member must attempt a question before another member has a second turn.
    3. Each question is worth 2 points.
    4. If the representative can't answer they may ask for help from the rest of their group for 1 point.
    5. If the group does not answer in 30 seconds, the other group may attempt to answer the question.
    6. Ask between 10-15 questions.

HINT:
The point system is to encourage kids to act independently rather than always fall back to their group. This could be beneficial for quiet, reserved kids.

INNOVATION PROJECT

SUGGESTED TIME: 45 minutes

1. Identify a problem for the Challenge

Prepare the team to identify a problem to research by confirming the team members understand the Challenge Theme (exploration of the theme was conducted in Week 3). Be prepared to take notes on something everyone can view such as a whiteboard or flip chart.

1. Have the team sit in a circle. Remind them that you want to hear from everyone. Consider going around the circle asking each child for a contribution.
2. Ask team members to share what they found in their Field Research from the last module.
    - What are three interesting facts you learned about the problem?
    - Are there any solutions that currently exist for this problem and why aren't they working well enough?
    - What are three possible ways to improve the existing solutions? What ideas do you have for completely new solutions to the problem?

	**HINT:** Sometimes kids start answering spontaneously. You can take advantage of this enthusiasm but remember that inclusiveness is important. After the initial burst of ideas you can transition to going around the circle child by child to prompt responses.
	**HINT:** Tell the students that the team might not choose their favorite problem, but they will choose something that everyone can support.

3. Help the team decide on a specific problem
    - On a whiteboard or piece of paper, write down each problem the team has researched.
    - Ask questions like:
        - Which problem best satisfies the Challenge requirements?
        - Which problem are the most people interested in?

- Which would have the biggest impact on our community or world?
- Which problem can we state very clearly?

HINT:
A good way to end questioning sessions is to ask "Does anybody have anything else to add?" If you believe a team member has not contributed, gently direct a question their way.

- Choose a final problem by following the decision making process the team decided upon at the beginning of the season.

2. Conduct Interview(s)

Have your team interview one of the professionals they identified in module 3.

- If the team is conducting the interview in person, over the internet, or via phone, have team members decide:
  - Who will ask the questions?
  - Who will record the answers?
  - How will they record the answers?
- If conducting the interview via email, email the professional the questions the team created in the last module.

ROBOT

SUGGESTED TIME: 40 minutes

1. Finalize and build attachment designs

- In the Field Research from the last module, the team members each came up with an idea for an attachment. Have each team member build their attachment. Have kids work together or individually. Make a note of which missions each attachment can attempt.
- Go around and have each team member demonstrate by hand how their attachment can do the mission they are attempting.
- Don't throw out any ideas at this point. Later, you will have the opportunity to refine and revise your attachments.

HINT:
Remember the Technic beam exercise. The team may be surprised to see how a simple attachment can be used to earn points.

- Attachment tips:
  - Attachments can be connected to motors on the robot. EV3 robots have four ports available to plug in motors.
  - Motorized arms that raise and lower can be used to solve missions, however, not all attachments need to be motorized.
  - Attachments may be passive or active. A passive attachment such as a plow may be used to control a mission model while pushing it. An active attachment may require a motor to raise or lower an arm containing an object or perhaps to rotate an arm.

2. Program Missions

In module 3, your team created a mission and programming plan. Now that you have your basic robot design and some attachments to try, you can begin programming!

HINT: After completing the EV3 basic Robot Educator units in Module 2, team members should be able to move the robot forward, backward, left and right. They should also understand how to use sensors to provide feedback to the EV3 controller so it knows where it is on the playing field. Use these skills to program the mission solutions.

HINT: Where the robot starts strongly influences where it ends. Keep good notes about where the robot is placed in home prior to leaving to attempt a mission. Consistency in starting position is very important.

HINT: It's allowable to bring paper notes to the competition table at a tournament for referencing. However, you cannot physically use the paper to align the robot since only LEGO® elements are allowed on the table.

LEARNING RESOURCES

- LEGO.com has links to the EV3 Mindstorm user community, apps for learning programming, and a variety of videos, galleries and games that can provide inspiration.
- The LEGO MINDSTORMS Education EV3 Software (that you use to program the robot) also has many programming tutorials that will be useful to the team.
- A comprehensive approach to robot design and programming with lessons categorized as Beginner, Intermediate and Advanced is available at EV3Lessons.com.

DEBRIEF

SUGGESTED TIME: 10 mins

1. Check the Timeline

1. Have the team check the timeline they created last practice.
2. If they are on schedule, congratulate them!
3. If they are a little behind, ask them what they can do to catch up.

2. Recap

Review what the team accomplished in this module. The team:

1. Identified a specific problem.
2. Interviewed a professional.
3. Built robot attachments.
4. Began programming robot missions.

3. Reflect

Ask the team:

1. What do you find interesting about the chosen problem?
2. How do you feel about programming the robot?

4. Give the students the Field Research for this week.

FIELD RESEARCH

Before the next module, team members should use the attached handout to do the following activities:

Innovation Project

- Research what is currently being done about the team's chosen problem and bring back two references containing information about the problem.

	**HINT:** Encourage the team members to use a variety of resources such as journal articles, books, periodicals, and the internet.

	**HINT:** Be sure the team members collect the references in a shared location, either online or on paper.

Robot

- Reflect on how programming the robot went in this module. Write down the next three steps the team needs to do to continue programming the robot.

Field Research

Module 4

Innovation Project

1. What is the team's chosen problem?

2. Research what is currently being done about the team's chosen problem and bring back two references containing information about the problem. Use references such as journal articles, books, periodicals, and the internet.

Robot

1. Think about how programming the robot went in this module. Write down the next three steps the team needs to do to continue programming the robot.
    1.

    2.

    3.

OTHER TASKS & TIPS

TASKS

1. Registration should have been completed for team members, coaches and mentors during Modules 1 and 2. If not, make time to accomplish the mandatory tasks. *FIRST*® LEGO® League tournament registration and participation will be difficult if not impossible until registration is completed.

TIPS

1. Coaches need to delegate in order to avoid burnout. Consider having a parent attend each meeting to help maintain order and focus.
2. If there are *FIRST* LEGO League events nearby that are prior to your team's competition, consider a field trip to familiarize yourself and the team members with the atmosphere of a *FIRST* LEGO League event. They can also benefit from touring the pit area and asking questions about each team's Innovation Project idea.

NEXT TIME

In the next module, the team will decide on a specific solution to their chosen problem and continue programming the Robot Game Missions.

Make sure that before you come to the next meeting you have reviewed *Module 5* thoroughly.

MODULE 5

SELECTING A PROBLEM AND PROGRAMMING MISSIONS

MODULE OVERVIEW

MODULE NUMBER: 5

DURATION: 2 hours

SUMMARY

In Week 5 the team will select a specific solution related to their chosen problem. They will also continue to program the robot missions.

Core Values to Focus on in This Module

- What we discover is more important than what we win.

OUTCOMES:

Educational standards alignments can be found at
https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST*® LEGO® League Challenge Set
2. Whiteboard or other writing surface
3. Pencil/Pens/whiteboard markers
4. Computer or tablet to program the robot
5. An envelope
6. 3 inches of tape
7. 5 rubber bands
8. Printed Field Research handouts

Note from An Experienced Coach:

The beginning of an FLL season can be overwhelming: you'll have to learn the rules to a new game, coordinate the team's building efforts and reinforce effective teamwork skills through the CORE values. In the end though, it is best to break things down into chunks, take a breath and realize that the processes is intended to be fun and it's all about the kids. These days I jump right into the building and programming LEGO robots with my class. The reason I do this because I've realized that the first stages of an FLL season are crucial towards building enthusiasm and excitement around the field of robotics. If you have a group with a wide range of abilities, because you have some returning students, create some pre-season activities which can be scaled up and down depending on programming ability. Once all students have a taste of what it is like to program in the EV3 language and have some experience building a robot (individually if resources allow) your group will be primed to brainstorm ideas for the robot game especially in relation to what can and cannot be achieved with their abilities thus far.

Kit Fuderich

INSPIRATION

SUGGESTED TIME: 15 minutes

Bridge Challenge

Materials:

1. An envelope
2. 3" of tape
3. 5 rubber bands

Goal: Create the longest bridge possible with the given supplies between two chairs or tables in five minutes.

Present the team with the supplies above, tell them the goal of the challenge, and say "Your time begins now!" Then sit back and let the team figure out how to build a bridge.

Discussion

Ask the team members the following questions to help them focus on the process of the activity as opposed to the end result.

1. How did you decide where to start?
2. How did you decide what to do with the materials?
3. Did you plan beforehand or did you just start building?
4. Did everyone feel like their ideas were heard and considered?
5. What did you learn by doing this activity?
6. What would you do differently if you did it again?

HINT:

If you have time and the team has ideas about what they would do differently, give them five more minutes to redo the activity.

INNOVATION PROJECT

SUGGESTED TIME: 45 minutes

1. Review the team's Field Research about the problem

In the Field Research for the last module, team members researched the problem the team identified. Have each team member share the references they found about the problem. They should tell:

1. Where they found the reference.
2. What they learned from the reference.

2. Brainstorm solutions to the problem

- Now brainstorm solutions to the problem. Before beginning the brainstorming session, remind the students of the brainstorming guidelines:
  - No idea is a bad idea.
  - Say any and every idea that pops into your head. Even a crazy idea might lead to something else (or it might not be as crazy as you thought!).
  - Keep a list of all the ideas.
  - Once you have a thorough list, then go back and narrow it down, but not before.
- Have the team keep a list of all the ideas.
- Ideas may be completely original or modifications of existing solutions.

3. Decide on a specific solution

- Now use your team's decision making process to decide on a single solution idea the team will build out and present.
- The following questions may help the team think through the options:
  - Which solution best satisfies our problem?
  - Which solution are the most people interested in?
  - Which solution would have the biggest impact on our community or world?
  - Which solution can we state very clearly?
  - Consider if the solution is something you or others could realistically implement. Your team does not have to implement your solution, but it might be something you want to consider when deciding on your solution.

	**HINT:** Have your team read the Innovative Solution section of the Innovation Project Judging Rubric when evaluating their solutions.
	**HINT:** If your team is having trouble agreeing upon a single solution, you may have them: 1. Take a vote. 2. Try multiple ideas to see which one works better. 3. Combine ideas, or take the best parts from each idea.
	**HINT:** Later in the year, your team might be selected for the *FIRST*® LEGO® League Global Innovation Award and get further help developing your innovative solution to your problem.

ROBOT

SUGGESTED TIME: 40 minutes

Continue programming and testing the robot missions

1. As a team, create a list of everything that needs to be done to complete the robot programming.
2. Decide which team members will do which tasks and set specific deadlines if the team hasn't already.
3. Continue to program the robot, test it, and make changes repeatedly.

ROBOT TIPS

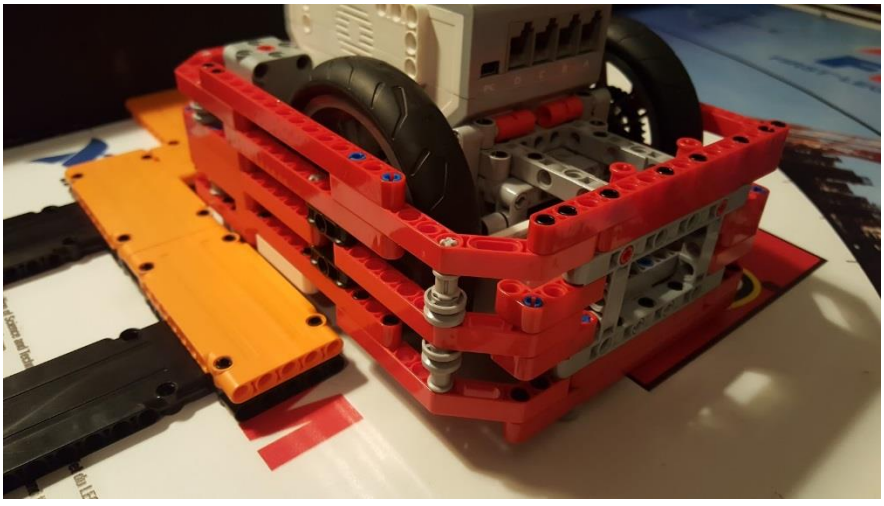
Batteries

Your EV3 robot probably came with the EV3 Rechargeable DC Battery and DC charger. With this battery, you can build your robot and not worry about having access to the battery compartment to change the battery. You simply plug in the robot between practices to charge it. (Be sure to leave access to the charging port.) You can also use AA batteries, but they will have to be changed frequently, so you will need to leave access to do that, or be able to remove the brick from your robot easily. While the EV3 Rechargeable DC Battery takes up slightly more room than the AA batteries, the difference is small, and the DC battery is a good option.

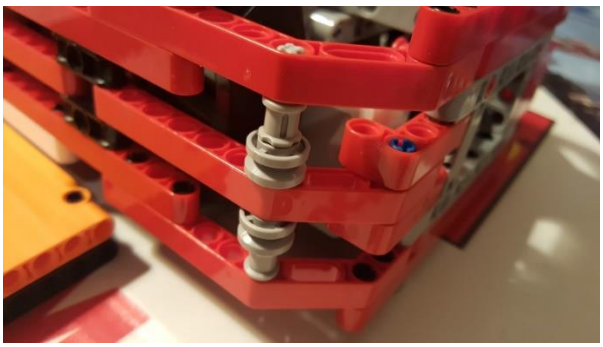
	**HINT:** Some teams will purchase an addition DC battery and keep one battery fully charged, for longer programming sessions. If you do this, you will still need to either leave access to the battery compartment or be able to remove the brick so that you can change the battery without taking apart your robot.
	**HINT:** When changing the battery, always wait until the brick has completely shut down before removing it. If you don't, it could delete the most recent version of your program that you have downloaded. Then you'd be running a previous version and you might not realize it.

Robot Features

1. Having a smooth border or bumper on your robot can help you align against a wall or other features on the table and can help prevent getting caught on table elements.



2. Adding smooth wheels or rollers to the side of the robot can help the robot roll smoothly along a wall and is a good way to travel long distances.



3. When designing attachments, try to keep it simple. Make sure the attachment affixes securely to the robot, but can also be easily changed between runs, if necessary.
4. A good attachment shouldn't require absolute precision every time, like threading a needle. Try to design the attachment so that there is some room for error.
5. Be sure all team members know how to secure the attachments to the robot so they are attached the same way every time. Try to design the attachment so it is clear and easy to see how to affix the attachment correctly.
6. Remember that making any significant physical changes to your robot, such as adding a heavy attachment could cause the robot to act differently. Think about this if you add something that increases friction or adds a load to the robot on one side.

Programming Tips

1. Be sure to take advantage of the resources provided with the LEGO® Mindstorms EV3 software. From the home page, click on the Robot Educator on the left of the screen. There you will find various tutorials. The "Basics" and the first four tutorials of "Beyond Basics" will walk you through the steps you need to be successful. These tutorials will give you vital skills to increase accuracy on the field, such as following a line, detecting when a touch sensor has been pressed, detecting colors, and using the ultrasonic sensor.
2. **Save your programs often!** Save them every few minutes during a practice, not just at the end of each practice. Make dated back-ups of your programs and store them somewhere other than the computer you use for programming, like a flash drive or cloud storage. If something happens to the computer, you will have access to them.
3. Don't try to program too many steps at once. Check for accuracy as you go.
4. Use the comments feature to document each section of your program. If you need to go back later to make changes, you can easily identify where you are in the program.
5. How to make your robot go straight video: https://www.youtube.com/watch?v=OlAO9Ho-N58

LEARNING RESOURCES

- LEGO.com has links to the EV3 Mindstorm user community, apps for learning programming, and a variety of videos, galleries and games that can provide inspiration.
- The LEGO MINDSTORMS Education EV3 Software (that you use to program the robot) also has many programming tutorials that will be useful to the team.
- A comprehensive approach to robot design and programming with lessons categorized as Beginner, Intermediate and Advanced is available at EV3Lessons.com.

DEBRIEF

SUGGESTED TIME: 10 mins

1. Check the Timeline

1. Have the team check the timeline they created last practice.
2. If they are on schedule, congratulate them!
3. If they are a little behind, ask them what they can do to catch up.

2. Recap

Review what the team accomplished in this module. The team:

1. Identified a specific solution to pursue for the Innovation Project.
2. Continued to program the robot missions.

3. Reflect

Ask the team:

1. What do you find interesting about the chosen solution?
2. How do you feel about your progress in programming the robot?

4. Give the students the Field Research for this week.

FIELD RESEARCH

Before the next module, team members should use the attached handout to do the following activities:

Innovation Project

- Write down two ideas of how you can present your solution to the judges.

HINT:
To understand the presentation requirements, see the Innovation Project Presentation section of the Challenge Guide and the Innovation Project Rubric.

Robot

- Programming is a process. Things never go as planned on the first try. Choose one issue your team ran into while programming the robot and write down one way the team can fix it.

Field Research

Module 5

Innovation Project

1. Write down two ideas of how you can present your solution to the judges.
   Hint: The project rubric tells how the judges will judge your presentation. See the rubric at http://www.firstinspires.org/resource-library/fll/judging-rubrics
   1.
   2.

Robot

1. Programming is a process. Things never as planned on the first try. Choose one issue your team ran into while programming the robot and write down one way the team can fix it.

OTHER TASKS & TIPS

TASKS

TIPS

1. Make sure your team is registered for your regional tournament. Registration happens through your regional partner's website. You can find local events at http://www.firstinspires.org/team-event-search#type=teams&sort=name&programs=FLL&year=2016.
2. Think about any ways that parents might be able to help with the upcoming presentation.
3. By the end of the 5th week, the team's first tournament may be looming large, and they may not be as far along as you (or they) would like in the process. Take stock of what is working for the team, and where they may be having problems. Congratulate them on what they are getting right. Ask them what they think they can do to solve problems they are having. Remember, the team "does the work", but coaches and parents are there to help them through the difficult times. Resist the temptation to give the team answers, but do help them develop/improve the processes they use for finding answers.
4. If necessary, remind the team of the core value for this week "What we discover is more important than what we win" - if they are learning and having fun, then they are "doing it right" even if they feel they aren't succeeding.

NEXT TIME

In the next module, the team will create their Innovation Project presentation and reduce the amount of errors they have in the robot missions.

Make sure that before you come to the next meeting you have reviewed *Module 6* thoroughly.

MODULE 6

CREATING THE PRESENTATION AND REFINING THE ROBOT

MODULE OVERVIEW

MODULE NUMBER: 6

DURATION: 2 hours

SUMMARY

In Week 6 the team will begin creating the presentation they will give to the judges at the *FIRST* LEGO League® competition. In addition, they will continue to refine the programming of the robot and fix any errors they have encountered.

Core Values to Focus on in This Module

- We share our experiences with others.

OUTCOMES:

Educational standards alignments can be found at
https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST* LEGO League Challenge Set
2. Whiteboard or other writing surface
3. Pencil/Pens/whiteboard markers
4. Computer or tablet to program the robot
5. Printed Field Research handouts

Note from An Experienced Coach:

Costumes, props, and models can make the presentation fun and memorable, but be sure they don't detract from clearly stating your problem and solution. Remember, the kids will need to set up the presentation quickly and without any help from you. Once you've created your presentation, begin practicing right away. The more times they practice, the more comfortable they will become. You and another parent or mentor can pretend to be the judges. Invite the students into the room, just like it will be on tournament day, and have the team introduce themselves. Don't forget to time them, and be sure they don't go over the five-minute time limit. Ask the team members questions based on the judging rubric for the remaining five minutes. Afterwards, talk about how it went. Ask them what they did well and what they think they could do better. Were they taking turns answering questions? Did they interrupt and talk over each other? Remember, the judges don't know how hard they've worked all season, and this is their chance to share all that they have accomplished!

Sonya Shaver

INSPIRATION

SUGGESTED TIME: 15 minutes

Teaching and Learning From Others

In this exercise, team members will teach a partner how to do a certain task. This is to help them learn to explain things clearly, as well as learn that everyone has something to learn and something to teach others.

1. Divide the team into pairs.
2. Have each team member choose a task to teach to their partner.

> **HINT:**
> This could be as simple as brushing their teeth, taking out the trash, or telling a joke.

3. Have the pairs decide which partner will go first.
4. Tell the first partners: "You have two minutes to teach your task to your partner. Go!"
5. Once the two minutes are up, repeat with the other partners.

Discussion

Ask the team members the following questions:

1. Was it hard to explain something to your teammate?
2. How did you figure out what to tell them?
3. How can we explain our Innovation Project to others?

> **HINT:**
> An additional talking point related to this activity is to show that you can learn something new from everyone and there is always something new to learn.

INNOVATION PROJECT

SUGGESTED TIME: 60 minutes

Create the Presentation

At every *FIRST*® LEGO® League tournament, each team will have 5 minutes to present their Innovation Project work to the Judges. You will begin creating the presentation in this module.

1. Look at the Judging rubric and use it to make a list of all the information you will need to include in your presentation.

    1. Be able to clearly state your problem.
    2. How many sources did you use in your research, and what type?
    3. What solutions currently exist?
    4. What is your solution, and can you clearly state it?
    5. How did you design your solution?
    6. How is your solution innovative?
    7. Can your solution be implemented?
    8. Did you implement your solution? If so, share the results and the impact of your solution.
    9. Who did you share your solution with? How would they benefit from it? (We will talk more about this in the next module.)

2. Decide how you want to present your information.
    - Ask the team members to share the ideas they came up with in the last module's Field Research. Do they want to present with a:
        - Skit
        - Song
        - Professional presentation
        - Or other creative approach?

	**HINT:** Some teams split up the five minutes and incorporate different approaches into the presentation.
	**HINT:** Have the team think about how they can stand out from other teams. How can they be creative and effective in getting their message across?
	**HINT:** Think about what is realistic to do in five minutes. That includes setup time and introductions, and the kids must do all of the setup themselves!

3. Start creating the presentation!
    - Begin writing the script. It is helpful to write out everything the team members will say, beginning with introducing the team and team members.
    - Divide the preparation between the team members.
    - Props or costumes can help your team stand out, but make sure they don't interfere with the team's ability to deliver the presentation effectively and efficiently.

- Whatever you haven't finished at the end of the practice, divide the remaining tasks to individual team members for this week's Field Research.

4. Make a list of what materials your will bring into the Innovation Project judging room.
   - A model or prototype of your invention or solution?
   - A trifold with information about your solution and the impact your solution can have?
   - A handout for the judges? If so, what will be included and who will be responsible for it?

	**HINT:** Make sure the kids can realistically do everything they plan in 5 minutes.
	**HINT:** Using technology in a presentation is risky. Have a backup plan! The judges have a very tight schedule, so they cannot give teams extra time to handle technical difficulties. Your team should be ready to carry on if the technology fails.

LEARNING RESOURCES

- *FIRST* LEGO League How-To: Present Your Project
  https://www.youtube.com/watch?v=hHV8d9sCthA

ROBOT

SUGGESTED TIME: 40 minutes

Refine Robot Programming
There are always improvements that can be made when programming a robot. Continue to test your robot and improve any errors, inefficiencies, or inconsistencies in its performance.

ROBOT TIPS

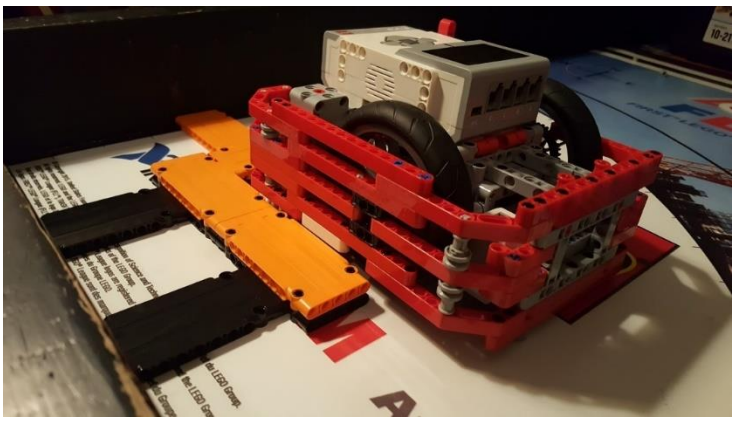
What to do when the robot isn't cooperating
As you move through the season, you are likely to encounter some robot malfunctions and mishaps. That's all part of the learning process! Help your team stay positive through the challenges, and encourage them to use their best problem-solving skills. Remember, your job as a coach is to guide them and ask questions. If you're getting different results every time you run a program, try to identify where the inconsistency is coming from. How do you find it and how do you fix it?
Here are some common issues that can cause inconsistencies:

1. **Too much dead reckoning.** Dead reckoning is having the robot move without any external feedback. For example, using move blocks without sensors or other outside help like a wall.

   What can you do about it? Use a feature on the table before and after sections that require dead reckoning. For example, you could line up with a wall, follow a line, or use a mission model to provide a reference point for the robot.

2. **Inconsistence alignment when starting from home.** If you aren't starting the robot in the same place every time, you will end up in a different place every time. Even small errors when aligning in launch will multiply as the program goes on and can cause inconsistencies.

   What can you do about it? Making a "jig" is the best way to align your robot in home. A jig is a guide that helps show you where to place your robot before launching it. That way, the robot will start in the same position every time. It will also increase consistency between different operators. *Remember that your jig can only be made from LEGO® parts!*



3. **Battery usage and charge.** Keep in mind that the robot can potentially act differently when operating on a low charge compared to a fully charged battery.

   What can you do about it? Charge the robot frequently, during breaks and between practices.

4. **Wheels slipping or robot jerking.** Sometimes the robot will jerk or skid, decreasing your accuracy and reacting differently with each run.

   What can you do about it? Check to be sure all of your wheels are making contact with the mat evenly. If your robot is jerking or skidding, try slowing the speed a little just during that section of the program. Experiment with different speeds to find the right balance between saving time and maintaining accuracy.

LEARNING RESOURCES

- LEGO.com has links to the EV3 Mindstorm user community, apps for learning programming, and a variety of videos, galleries and games that can provide inspiration.
- The LEGO MINDSTORMS Education EV3 Software (that you use to program the robot) also has many programming tutorials that will be useful to the team.
- A comprehensive approach to robot design and programming with lessons categorized as Beginner, Intermediate and Advanced is available at EV3Lessons.com.

DEBRIEF

SUGGESTED TIME: 10 mins

1. Check the Timeline

1. Have the team check the timeline they created last practice.
2. If they are on schedule, congratulate them!
3. If they are a little behind, ask them what they can do to catch up.

2. Recap

Review what the team accomplished in this module. The team:

1. Planned their Innovation Project presentation.
2. Improved the Robot.

3. Reflect

Ask the team:

1. How do you feel about presenting in front of people?
2. How can we be more comfortable speaking in public?
3. How do you feel about the progress of the robot?

4. Give the students the Field Research for this week.

FIELD RESEARCH

Before the next module, team members should use the attached handout to do the following activities:

Innovation Project

- Write down one person or group who may benefit from hearing about your project.
- Continue working on any presentation tasks you've been given.

Robot

- Choose one issue your team is having with the robot and write or draw one way it might be fixed.

Field Research

Module 6

Innovation Project

1. Write down one person or group who may benefit from hearing about your project.

2. Continue working on any presentation tasks you've been given.

Robot

1. Choose one issue your team is having with the robot and write or draw one way it might be fixed.

OTHER TASKS & TIPS

TASKS

1. If you have any parents that did not register their child in STIMS, make sure you get a paper copy of their Consent & Release form to bring to the tournament.
2. Make sure your team is registered for your local tournament.
3. If you ordered t-shirts or other team paraphernalia, make sure the order will be ready by the tournament date.
4. Make sure to check the Challenge updates every week.

TIPS

1. Some teams make small trinkets or handouts related to their team's Innovation Project or team identity to share with other teams at the tournament. They are absolutely **NOT** required, but can be a fun addition if you have the time and resources.

NEXT TIME

In the next module, the team will share their Innovation Project solution with someone who would benefit from it, practice their presentation, and continue to improve the Robot's performance.

Make sure that before you come to the next meeting you have reviewed *Module 7* thoroughly.

MODULE 7

PRESENTATION PRACTICE AND ROBOT JUDGING PREPARATION

MODULE OVERVIEW

MODULE NUMBER: 7

DURATION: 2 hours

Core Values to Focus on in This Module

- We display Gracious Professionalism® and Coopertition® in everything we do.

SUMMARY

In Week 7 the team will finalize and practice their Innovation Project presentation, and decide who they want to share their solution with. They will also continue improving the Robot, and practice talking about their Robot design process in preparation for the Robot Judging session.

OUTCOMES:

Educational standards alignments can be found at https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST*® LEGO® League Challenge Set
2. Whiteboard or other writing surface
3. Pencil/Pens/whiteboard markers
4. Computer or tablet to program the robot
5. Printed Field Research handouts

Note from An Experienced Coach:

When practicing for the Robot Judging sessions, do your best to simulate the tournament environment. Have them run a program and describe what the robot is doing. Encourage them to talk about what is happening, how things work, what led them to try a particular strategy, and the process they went through of getting the robot to work. Encourage them to think of it like a conversation. Elaborate and try to build off of previous topics to keep the flow going. If you run out of things to talk about on one topic, offer to run another program for the judges and continue to describe what the robot is doing. If you keep building off of previous topics, you will be able to get more information across to the judges. You might have the team decide in advance who will answer questions on certain topics. That way, they can practice sharing various points, highlights, and stories from the season.

William Shaver

INSPIRATION

SUGGESTED TIME: 15 minutes

Doctor, Doctor!

Goal: Get the team untangled.
How to play:

1. Have each member stick out his or her right hand and grab the hand of someone else on the team.
2. Repeat with the left hand.
3. Without letting go of anyone's hand, the team should try to untangle itself in five minutes or less.

Discussion

Ask the team the following questions:

1. How did you work together?
2. Did team members have differing ideas of how to get untangled? If so, what did you do?
3. How can we display Gracious Professionalism® at the tournament?
4. How can we display Coopertition® at the tournament?

Gracious Professionalism®

Gracious Professionalism is part of the ethos of *FIRST*. It's a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.

With *Gracious Professionalism*, fierce competition and mutual gain are not separate notions. Gracious professionals learn and compete like crazy, but treat one another with respect and kindness in the process. They avoid treating anyone like losers. No chest thumping tough talk, but no sticky-sweet platitudes either. Knowledge, competition, and empathy are comfortably blended.

In the long run, *Gracious Professionalism* is part of pursuing a meaningful life. One can add to society and enjoy the satisfaction of knowing one has acted with integrity and sensitivity.

https://www.youtube.com/watch?v=h2e6gxczMxc

Coopertition®

Coopertition produces innovation. At *FIRST*®, *Coopertition* is displaying unqualified kindness and respect in the face of fierce competition. *Coopertition* is founded on the concept and a philosophy that teams can and should help and cooperate with each other even as they compete.

Coopertition involves learning from teammates. It is teaching teammates. It is learning from Mentors. And it is managing and being managed. *Coopertition* means competing always, but assisting and enabling others when you can.

INNOVATION PROJECT

SUGGESTED TIME: 45 minutes

1. Finalize the Innovation Project Presentation

In the Field Research for the last module, the team worked on their assigned portions of the presentation. Now it's time to bring them all together and finalize the presentation.

1. Have the team gather all the pieces from each member and make any final changes to the presentation script.
2. Do a timed read-through to see if you are under the five-minute limit. If not, have the kids decide what changes need to be made.

HINT: Decide whether the team members will memorize the script or if they will use cue cards.

HINT: It is okay if the presentation is slightly under five minutes, but it absolutely cannot go over five minutes. Many judges will stop the team when the time reaches five minutes.

2. Practice the Innovation Project Presentation

Now the team needs to practice the presentation! Run through the presentation several times, timing it each run through.

3. Make plans to share your solution

In the Field Research for the last module, the team members came up with a person or group who may benefit from hearing about their project.

1. Ask each team member to share their person or group with the team.
2. As a team, decide who you would like to share your project with. It can be as many people or groups as you want.
3. Make plans to share your project with these people or group(s). The team can share by:
    1. Meeting in person
    2. Email
    3. Phone

HINT: The coach or a designated parent should set up the meeting.

HINT: If possible, share your project in person. This allows the team to practice their presentation and answer questions in front of a live audience.

4. Make a Innovation Project handout for the Judges

1. Refer back to the Project Judging rubric.
2. Use these sections to create a Project handout for the judges.
3. Create a section in the handout for each of the rubric sections. This can be the same information that is in your presentation.
4. Create a list of any and all references and sources you used throughout the Project and include it at the end of your handout or any visual aids used in your presentation.
5. Include interviews you conducted, books or articles you read, and websites you consulted.

HINT: You can use the same information in the handout and create a larger trifold for use during the presentation.

HINT: You can create anything from a one page handout to a multi-page report, but know that if there is too much information, the judges won't have time to read it all.

ROBOT

SUGGESTED TIME: 40 minutes

ROBOT TIPS

1. Continue programming and increasing accuracy and consistency.

HINT:
Use the comment block to add comments in the code to help people reading your code understand what it does. Comments are not executed by the robot.

2. Prepare for the Robot Judging Session

1. Read the Robot Judging Rubric.
2. Make a list of how your robot addresses each of the rubric items.
3. Ask the team members questions about the rubric items as they run the robot to help them learn to articulate their design process.
4. Do a practice judging session with the team. Have the team walk in and introduce themselves. Have the team practice running one or two of their programs and describe to you what the robot is doing. Ask the team questions, addressing each point in the judging rubric.

HINT:
Do this several times to help the team members remember their talking points when they go into the judging room.

LEARNING RESOURCES

- LEGO.com has links to the EV3 Mindstorm user community, apps for learning programming, and a variety of videos, galleries and games that can provide inspiration.
- The LEGO MINDSTORMS Education EV3 Software (that you use to program the robot) also has many programming tutorials that will be useful to the team.
- A comprehensive approach to robot design and programming with lessons categorized as Beginner, Intermediate and Advanced is available at EV3Lessons.com.

DEBRIEF

SUGGESTED TIME: 10 mins

1. Check the Timeline

1. Have the team check the timeline they created last practice.
2. If they are on schedule, congratulate them!
3. If they are a little behind, ask them what they can do to catch up.

2. Recap

Review what the team accomplished in this module. The team:

1. Made plans to share their Project with others.
2. Practiced their Innovation Project presentation.
3. Improved the Robot.
4. Made a Robot Handout for the judges.

3. Reflect

Ask the team:

1. How prepared do you feel for the presentation?
2. If we don't feel prepared, what can we do to be more prepared?
3. How close is our robot to being competition ready?
4. What can we do to complete the robot?

4. Give the students the Field Research for this week.

FIELD RESEARCH

Before the next module, team members should use the attached handout to do the following activities:

Innovation Project

- If your team has decided to memorize the presentation script, memorize your part.
- Read or recite your part of the presentation with a friend or family member who can read the other parts.

Robot

1. Think about a story of when something wasn't working or something went wrong, and write down how you fixed it.

Field Research

Module 7

Innovation Project

1. If your team has decided to memorize the presentation script, memorize your part.

2. Read or recite your part of the presentation with a friend or family member who can read the other parts.

Robot

1. Think about a story of when something wasn't working or something went wrong, and write down how you fixed it.

OTHER TASKS & TIPS

TASKS

1. Setup a time for your team to share their Innovation Project with the designated person(s) or group(s).
2. Communicate with the parents about the tournament details, including transportation, time, etc.

TIPS

1. Some teams make small trinkets or handouts related to their team's Innovation Project or team identity to share with other teams at the tournament. They are absolutely **NOT** required, but can be a fun addition if you have the time and resources.

NEXT TIME

In the next module, the team will make preparations for presenting and competing at their first tournament. It's almost here!

Make sure that before you come to the next meeting you have reviewed *Module 8* thoroughly.

MODULE 8

PREPARING FOR THE TOURNAMENT

MODULE OVERVIEW

MODULE NUMBER: 8

DURATION: 4 hours

SUMMARY

In Week 8 the team will prepare for the tournament by reviewing the rubrics, making packing lists, practicing all three judging sessions (Core Values, Innovation Project, and Robot Design), and practicing their robot runs.

Core Values to Focus on in This Module

- We have FUN!

OUTCOMES:

Educational standards alignments can be found at https://www.firstinspires.org/community/educators

MATERIALS

1. *FIRST*® LEGO® League Challenge Set
2. Whiteboard or other writing surface
3. Pencil/Pens/whiteboard markers
4. Computer or tablet to program the robot
5. Printed Field Research handouts

Note from An Experienced Coach:

I went from clueless in 2010, the Body Forward Challenge, to taking a team to Worlds in 2016, Trash Trek Challenge from VA-DC. My first season I had no idea what I was doing. I learned three important lessons: 1) robots are not consistent 2) kids need structure and 3) the team's attitude and robot game scores are connected. The first year is the hardest. As you stick with it, you will be amazed how much you and your team will grow and connect. Just focus on fun and everything comes together.

Scott Rakestraw
Coach, VA-DC Judge Advisor and Founder of StartingPoints.com, useful technology for FLL teams.

Capital Teens

INSPIRATION

SUGGESTED TIME: 60 minutes

Tournament Preparation

1. To prepare for the Core Values Judging Session, go over the Core Values Rubric.

> **HINT:** Some regions require the team to create a Core Values Poster. Contact your local tournament director or representative to find out if your region requires it.

2. Make a list of talking points based on the rubric.

> **HINT:** You might want to assign a talking point to each team member. If that point does not come up during the Q&A time, encourage the team members to add those points into the conversation.

3. Fill out the Team Information Sheet. Print and bring 4 copies to the tournament. You will take one copy into each Judging session.
4. Make a packing list of what the team needs to take into the Core Values Judging Session.
    1. Team Information Sheet
    2. Core Values Poster (optional)
    3. Anything else the team wants to share with the Judges.
5. Practice the Core Values Judging Session.
    1. Have the team members walk into the room and introduce themselves, just like they will for their Judging Session.
    2. Give them a Core Values challenge (just like the Inspiration activities you've been doing!), and tell them they will have five minutes to complete the challenge.

> **HINT:** The challenge will either be an engineering challenge or a puzzle the team has to figure out.

> **HINT:** The team members will have the opportunity to ask any questions about the challenge *before* the five minutes start. Make sure the students clarify anything they don't understand before the time starts.

    4. Time the challenge.
    5. Then spend an additional five minutes asking the team questions about their:
        1. Season
        2. Roles on the team
        3. How they worked together
        4. Other questions based on the Core Values Judging Rubric.

> **HINT:** This should take exactly ten minutes. It's important to practice this timed so the team members know what to expect at the tournament.

6. Discuss the Practice Session
    1. What went well?
    2. What didn't go well?
    3. What would the team do differently next time?

> **HINT:** Encourage the team to be proud of themselves and their accomplishments!

INNOVATION PROJECT

SUGGESTED TIME: 60 minutes

Sharing Session

Follow through with your plans to share your presentation with someone who would benefit from it. This will likely happen outside of normal practice time.

Tournament Preparation

1. To prepare for the Innovation Project Judging Session, go over the Innovation Project Judging Rubric.
2. Make a list of talking points based on the rubric.

> **HINT:**
> You might want to assign a talking point to each team member. If that point does not come up during the Q&A time, encourage the team members to add those points into the conversation.

3. Make a packing list of what the team needs to take into the Innovation Project Judging Session.
    1. Team Information Sheet
    2. Project poster or other visual aids they created
    3. Project handout
    4. Anything else the team wants to share with the Judges
4. Practice the Project Judging Session
    1. Have the team members walk into the room and introduce themselves, just like they will for their Judging Session at the tournament.
    2. Give them exactly five minutes to give their presentation.
    3. Then spend an additional five minutes asking the team questions about their:
        1. Project
        2. Solution
        3. How their solution can impact their community or others
        4. Other questions based on the Project Judging Rubric.

> **HINT:**
> This should take exactly ten minutes. It's important to practice this timed so the team members know what to expect at the tournament.

5. Discuss the Practice Session
    1. What went well?
    2. What didn't go well?
    3. What would you do differently next time?

> **HINT:**
> Encourage the team to be proud of themselves and their accomplishments!

6. Have the team practice this a couple of times if time allows.

ROBOT

SUGGESTED TIME: 2 hours

1. Robot Judging Session Preparation

1. To prepare for the Robot Judging Session, go over the Robot Judging Rubric.
2. Make a list of talking points based on the rubric.

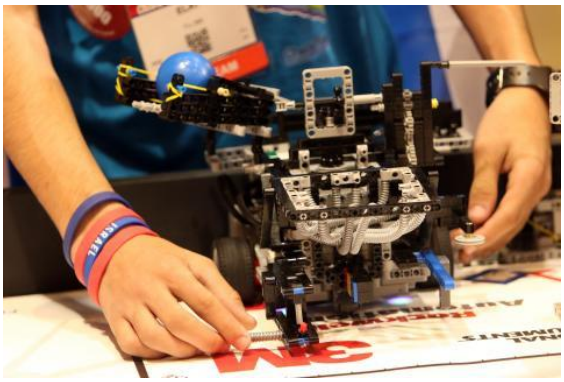
> **HINT:**
> You might want to assign a talking point to each team member. If that point doesn't come up during the Q&A time, encourage the team members to add those points into the conversation.

3. Make a packing list of what the team needs to take into the Robot Judging Session.
    1. Team Information Sheet
    2. Robot
    3. All attachments
    4. Any alignment jigs your team created for lining up the robot at the beginning of a program.

> **HINT:**
> Remember that all equipment must be made entirely of LEGO®-manufactured building elements in original factory condition.

    5. Robot handout or visual aids (optional)
    6. Robot game cheat sheet written on paper if the team needs one (optional)
    7. Anything else the team wants to share with the Judges

4. Practice the Robot Judging Session
    1. Have the team members walk into the room and introduce themselves, just like they will for their Judging Session.
    2. Ask the team to run one or two of their programs.
    3. As they are running the program, ask them about their:
        1. Robot Design
        2. Programming
        3. Challenges they faced throughout the season in building and programming the robot
        4. Other questions based on the Robot Judging Rubric.



> **HINT:**
> Judges often ask additional questions such as:
> - What is your favorite program and why?
> - What is your favorite mission?
> - What is your favorite thing about your robot?

> **HINT:**
> This should take exactly ten minutes. It's important to practice this timed so the team members know what to expect at the tournament.

5. Discuss the Practice Judging Session

1. What went well?
2. What didn't go well?
3. What would you do differently next time?

> **HINT:** Encourage the team to be proud of themselves and their accomplishments!

> **HINT:** Remember the team that the Judges weren't with them throughout the season, so they need to summary all of their hard work. The Judges don't know what they know, so be sure the team shares all they can with them.

6. Have the team practice this a couple times if time allows.

2. Robot Game Preparation

1. Make sure you have checked the *FIRST*® website for any last-minute game updates or clarifications.
2. Make a packing list of what the team needs to take to every Robot Game match:
    1. Robot
    2. All attachments
    3. Any alignment jigs your team created for lining up the robot at the beginning of a program.

> **HINT:** Remember that all equipment must be made entirely of LEGO-manufactured building elements in original factory condition, except:
> - LEGO string and tubing may be cut to length.
> - Reminders written on paper are okay.
> - Marker may be used only in hidden areas for ownership identification.

    4. Robot game cheat sheet written on paper if the team needs one (optional)
3. Practice timed runs of the Robot Game.
    1. Remember that the Game lasts exactly 2 minutes and 30 seconds.
    2. Remember that only two team members at a time can be at the *FIRST* LEGO League game table. However, team members can switch places during the match.
    3. The other team members must stand back, but they can watch and offer help and encouragement from the sidelines.
4. Discuss the Practice Robot Game
    1. What went well?
    2. What didn't go well?
    3. What do you want to remember for tournament day?

> **HINT:** Encourage the team to be proud of themselves and their accomplishments!

5. Have the team practice as many timed runs as time allows.

LEARNING RESOURCES

- LEGO.com has links to the EV3 Mindstorm user community, apps for learning programming, and a variety of videos, galleries and games that can provide inspiration.
- The LEGO MINDSTORMS Education EV3 Software (that you use to program the robot) also has many programming tutorials that will be useful to the team.
- A comprehensive approach to robot design and programming with lessons categorized as Beginner, Intermediate and Advanced is available at EV3Lessons.com.

DEBRIEF

SUGGESTED TIME: 10 mins

1. Recap

Review what the team accomplished in this module. The team:

1. Made packing lists for the tournament.
2. Reviewed the three Judging Rubrics.
3. Practiced all three Judging Sessions.
4. Practiced the Robot Game.

2. Reflect

Ask the team:

1. How do you feel about the tournament?
2. How do you feel about the three Judging Sessions?

OTHER TASKS & TIPS

TASKS

1. Print the team roster in the Team Registration System before the tournament.
2. Have everyone who didn't register online complete paper consent forms.
3. Be sure to print four copies of the *FIRST*® LEGO® League Team Information Sheet and bring them to the tournament.
4. Don't forget to have FUN with your team!
5. Remind the team that the tournament is a time to share what they've done with other teams, judges, and the public. Encourage them to have fun with the process and it will go well. Celebrate the team's successes!

TIPS

1. Some teams will meet for a couple of extra practice sessions before the tournament to practice the Project presentation and Robot runs, so try to set this up if scheduling allows.

NEXT TIME

The next step is your first *FIRST*®LEGO® League tournament! Go, do your best, and have fun! If your team qualifies for the next round of events, continue to meet and refine your Core Values, Project, and Robot. There are always improvements to be made. If the team doesn't qualify, that's okay! Hopefully they had fun and learned a lot throughout the season to prepare them for next year!