THE TOURNAMENTS

CHAPTER 7

For many FLL teams, the tournament is the reward for all their hard work throughout the season. While there are several types of FLL events, they all offer a fun and exciting way for teams to demonstrate the result of their efforts.

EVENT TYPES

Championship, Local, and Qualifying Events – How They Work

The FLL season culminates with local events, qualifying tournaments or events (qualifiers), and Championship tournaments.

Local Events are generally, but not always, smaller than other tournaments. They are run by volunteers (or teams) who have the freedom to choose the format, judging guidelines, and awards. Local tournaments do not qualify a team to attend a Championship tournament or the World Festival.

Qualifying Tournaments (sometimes called Regionals) usually follow judging guidelines and a similar format to Championship tournaments, but have some flexibility in format and awards. Anywhere from one to twelve winning teams from these tournaments advance to that region's Championship tournament. Qualifying tournaments do not qualify a team to attend the World Festival.

Championship Tournaments (formerly called Officials) abide by certain standards in format, judging, awards, and overall quality. The key volunteers responsible for a Championship tournament are usually FLL Partners. One team from the Championship tournament may be invited to attend the FLL World Festival, but this will not occur every year due to space restrictions. Some Championship tournaments require that teams win at a qualifying or regional tournament in order to advance to the Championship. For many FLL teams and regions, a Championship tournament is the highest level of FLL tournament participation. Championships may include teams from a geographic region, province, state, country, or several countries.

REMINDER

A team's performance is reflected in the behavior of the adults as well as the kids, and judges will note **everyone's** behavior at tournaments. FLL expects coaches, mentors, parents, and other family members to model good behavior and gracious professionalism.

TIP

Many teams host qualifying events for their local FLL Partner. Contact your partner for more information.

The FLL World Festival, held in conjunction with the *FIRST* Championship, is a global celebration of FLL teams from around the world. The selection process for the World Festival may change from year to year, depending upon the number of spaces available and the number of teams participating in FLL.

TIP

An FLL tournament is an exciting, absolutely unique event. And be warned – it is also very LOUD. Between the kids, the music, and the announcers, do not expect any quiet time for your team!

FLL Partners and volunteers plan, coordinate, and run the tournaments. These events allow team members to come together to celebrate their accomplishments. Most events have opening and closing ceremonies, wonderful trophies and medals, teams with personalized T-shirts, hats, banners, and even some costumes.

Teams are recognized for excellence in various aspects of the Challenge and associated teamwork. The highest honor, the Champion's Award (formerly the Director's Award), is determined by performance in four categories of competition and consideration of how the team demonstrated FLL values to all the judges. Additionally, Championship tournament participants all receive an FLL medallion commemorating the team's accomplishments during the season and showing that in doing their best, they succeeded.

There is no way to describe an FLL tournament and no way to prepare you for what's in store. Expect the unexpected and focus on creating a fun experience for your team members. Talk to them well in advance of the tournament regarding awards. Teach them that their season is about more than one day's results, and that not all teams can win an award. Another team's award takes nothing away from your team's achievements, and those achievements should be the kids' focus and yours. Be sure the parents of your team members understand this as well, as some parents unintentionally put pressure on their kids to win. As the coach, you set the tone for the whole team.

REMINDER

An FLL team consists of no more than ten children.

TOURNAMENT APPLICATIONS

Championship Tournament Applications

A complete listing of confirmed Championship tournament sites is posted on the FLL international website (firstlegoleague.org) in September or October. In October, teams apply either online or directly with the tournament organizer for most Championship tournaments. Many FLL Partners coordinate their own application process, so check the FLL website to determine how your team can apply. Be sure that your team's contact information in your team profile is up-to-date and complete before applying for a tournament so you can receive FLL updates during the season.

REMINDER

The application period is time-sensitive. There is typically a two-week registration period for applications.

Applying for a Tournament

- For tournament information, go to the FLL website (firstlegoleague.org) under Teams and Tournaments.
- Be aware that the event schedule may not be complete until the season is well underway. Consequently, the tournament application process is entirely separate from the online team registration process.
- If you are applying for a Championship tournament, determine whether you need to attend a qualifying or regional tournament first by checking the tournament information. If so, confirm what criteria determine advancement to the Championship tournament.
- Confirm event start and end times, parking details, what to bring, food service, etc.
- Collect completed Consent and Release forms from all students and mentors for each tournament you attend. You can find the form on the FLL website under Tournaments.
- Prepare your team introduction pages (found on the FLL website under Tournaments) and make copies.

Important Reminder: Review the policy about adult intervention in Chapter 8: Judging Criteria.

Due to limited site capacity at some tournaments, an application does not ensure acceptance at an event. If you apply for more than one tournament on the FLL website, the application system accepts the most

recent application and deletes any prior applications. If you choose to register for more than one Championship tournament, you must apply for the second by contacting the tournament organizer. Refer to the award eligibility policy as your team will only be eligible for any awards at the first Championship tournament you attend.

Once the application period ends, confirmed teams receive detailed information from the FLL Partner hosting the event. This information includes specific details about the site, special instructions, forms, and schedule information. Teams can expect to pay a fee to attend a tournament. The tournament coordinators will inform you of the fees and the payment procedures.

TIP

If possible, find a group of adults to act as judges for a dress rehearsal. This helps for both the project presentation and as a practice question and answer session. Videotape the dress rehearsal for the team to watch later. When reviewing the tape, do not allow the team members to ridicule or mock each other. Here is a good opportunity to discuss gracious professionalism. They can discuss team roles, how they covered important points, places to save time or labor, and the team's appearance.

Tournament Logistics

TIP

Be sure to contact your local media to invite them and promote your team. See Appendix B for a sample press release.

Once you register for a tournament, either through the FLL website or with your local tournament organizer, it's a good idea to check the tournament website regularly for changes and updates. Be aware that every tournament is different in some way. *FIRST* gives latitude to tournament organizers to adjust the format to match their conditions. Always double check with the tournament organizer if you have specific concerns. If you need to travel to a competition, follow your school or other sponsor's procedures. Make sure each driver is properly insured and you have any relevant, completed paperwork, such as permission slips and Consent and Release forms.

Most FLL events are free and open to the public. We recommend that you encourage parents, siblings, sponsors, and friends to attend the tournament and cheer on your team!

TIP

If you have children on your team attending without parents or legal guardians, we suggest that you have copies of their medical insurance information. Consider recording the following information for each team member:

- Name, phone number, and complete physical address of insured
- Name and address of insurance company
- Group and/or ID number
- Phone number to contact parents during the tournament
- Phone number of insurance carrier
- Name for billing
- Any medications the child is currently taking
- Any allergies that a child might have, including medication allergies
- Any other necessary information
- A waiver, signed by the parents, giving you the right to authorize appropriate medical assistance in case of injury or sickness

Adult Supervision and Safety

Adult supervision is a critical factor for a successful tournament. Whether the team is in the pit, moving about the site, or performing competition rounds, make sure all team members are supervised. Use the buddy system and have each child travel with at least one other person. Remind each person attending with you that the team is expected to demonstrate FLL values at all times.

Rookie Teams

Participating in an FLL tournament is the best way for your team to learn! Even if your team doesn't complete as much as it wants to this season, take part in a competition anyway. Kids learn from seeing other teams' robots and projects, and they usually leave an event with great ideas for next year. You will too. You may even discover that the kids accomplished more than they thought, and they always have fun. That's what FLL is all about.

SNAPSHOT

The best advice I received as a rookie coach was to flaunt it. When you attend a tournament, mention the fact that you're a rookie team on your Team Profile sheet; tell the judges, and include it in your team's pit table display. It's your one and only rookie season. Show it in your team spirit and celebrate all your accomplishments. If you don't tell people, they won't know. You and your team have so much to be proud of! Have fun and make the most of your first FLL experience.

TOURNAMENT AREAS

Registration

Upon arrival at the tournament, your team must first find the registration table and check in. Tournament hosts require that you bring a signed Consent and Release form for every attending team member and volunteer. These forms are available on the FLL website (firstlegoleague.org). Submit the completed forms during registration at each tournament you attend.

Have a copy of your team introduction page with you (also available on firstlegoleague.org). This is a résumé for your team, listing the team name and number as well as the names and ages of each team member. It gives you an opportunity to share some fun tidbits or interesting stories about the team to help the judges remember your team during competition. You may need to supply a copy of your Team Introduction page at the registration table; however, some tournaments ask you to submit it directly to judges during your session.

The tournament volunteers will tell you where to find your pit station, the competition area, judging rooms, and where you may eat lunch. They will also give you a schedule for your team.

At most tournaments, all of the teams arrive during the same half

TIP

Cameras with infrared flash or lighting of any sort are usually not allowed at tournaments because they may interfere with robot programs. Flashes can interfere with robots using light sensors during competition. Be sure to let your team's parents know ahead of time so they can bring cameras or other recording devices that are permitted.

hour. It can be very chaotic, and lines sometimes form at the registration table for a brief period. Keeping your forms organized, and ensuring that you have all the necessary paperwork when you arrive, can help to reduce your wait.

The Pit

The pit will be your home for the day. You may be assigned a specific location to set up your station when you register, but some events have areas that are first-come, first-served. Check with the officials to confirm that spectators are allowed in the pit, as some facilities allow only team members, coaches, and mentors in the area. Regardless of the size of your station, be gracious and keep your team within the confines of your space.

Generally, a pit table will be provided so you can set up a display for other teams to see, show off your robot, and make minor repairs. If your team has any posters or banners, set them up to showcase your teamwork and team spirit.

Electricity may be provided at the pit, but if you choose to bring a laptop, make sure it's fully charged. You may want to bring along a heavy-duty extension cord and a power strip. Some venues have no power other than a few scattered laptop recharging stations, so plan accordingly. Refer to the Tournament Checklist in Chapter 9: Checklists and Schedules, to be sure you arrive with everything you need. Many tournaments send out a list of "Must Bring," "Should Bring," and "Thou Shalt Not Bring" items.

TIP

1. Bring a storage container for personal items such as hats, gloves, jackets, etc. Keep it beneath your pit table to minimize clutter while maintaining the safety requirements necessary for movement in the pit.

2. It will happen... someone will drop a robot and watch the parts explode in a million directions. Consider using a plastic container or recycled cardboard box as a garage for carrying your robot during the competition. If it drops, you have a better chance of collecting the parts and reassembling it. Decorate your garage to show your team spirit!

Practice Playing Field(s)

Many tournaments provide access to a practice field where teams take turns running rounds. If a field is provided, scheduling is often tight and you may have to reserve table time. Please remember to use gracious professionalism when sharing the practice tables with other teams.

Competition Area

The competition area is where the official robot competition playing fields are located and rounds are scored by official referees. Two teams simultaneously demonstrate their robots, one on each side of an 8' x 8' table made up of two playing fields.

Technical and Project Judging Rooms and Equipment

Judging for the technical awards and the project generally, but not always, takes place in rooms separate from the rest of the competition. Your team will report to each of these rooms at some point during the day, so make sure you know where they are and when you need to be there. Double check with tournament organizers to be sure that any extension cords or audiovisual equipment you brought along for your project presentation are ready to go. If the tournament organizer is providing these materials, confirm that they are still available well in advance of your interview. If they are not available or not working, prepare your team to present without them.

TIP

By the time you run several rounds, perform for the technical judges, and make and test any programming changes, your batteries may be low. During the day, take every opportunity to check your batteries. See the battery section of Chapter 4: Materials and Mechanics.

Time Management

After you set up your pit station, review the day's schedule with your team members. There is a sample schedule in Chapter 9: Checklists and Schedules. Competition schedules are usually very tight, so it's important that you are ready and on time. Don't miss your round or judging session. If the schedule for the day does fall behind, the tournament organizer may juggle your team's interviews to accommodate the

changes. Be flexible, and check in with the pit administration or at the registration table if you have questions about your schedule.

As the coach, you will concentrate on getting to scheduled judging appointments and rounds on time. Delegate the responsibility of keeping your team together to other volunteers. Some events hold a coach's meeting where you receive up-to-date information and have an opportunity to discuss any robot rule clarifications.

HOW THE DAY WORKS

The Opening Ceremony

Usually the opening ceremony is very high energy and sets the tone for the day. At most tournaments, teams have about an hour for registration, setup, and time on the practice fields prior to the opening ceremony. Some tournaments schedule the opening ceremony for mid-day before the robot performance rounds. Judges and special guests are introduced, the Challenge and scoring are explained, and the national anthem is usually played. After the opening ceremony, teams not immediately scheduled for the competition rounds or a judging meeting should return to the pit to listen for queuing or prepare to meet with the judges.

Rounds

During the day, you typically get at least three rounds lasting 2½ minutes each at the competition tables. The organizers may pair you with the same team each round or mix up the pairings. Some tournaments have runners or team liaisons to take you to a match, but at other events, teams are responsible for their own schedules. Failure to arrive for a match can result in a loss of points.

Teams must listen carefully for their queue calls to the designated queuing area to line up for their rounds. Assign two individuals to listen for queuing calls and to keep the team on schedule. Queuing is the process of lining teams up for their robot rounds and judging sessions to ensure that they stay on time. When the time comes, your team will be called to the robot competition table.

Unexpected delays may occur. Remain flexible. The tournament organizers are volunteers, just like you.

When your round begins, have both robot operators move to the table while you get your team settled in the team seating/standing area. FLL expects tournaments to allow team members to rotate out during their rounds, but there are a few tournaments where fire codes prevent switching. Your tournament organizer should alert you if tournament policies do not allow switching.

If you rotate operators in and out between missions, make sure all operators are in place to change. Remember that the clock does not stop for your operators to change. Be aware that some tournaments do not allow coaches or team members who are not robot operators into the area immediately around the table.

Your robot operators should follow the table referee's instructions at the table. Before starting, have them scan the table to make sure it is properly set up. Once the match starts, it is too late to change the table.

Scoring Confirmation

At the end of the match, have the two robot operators witness the referee's scoring of the table. The team's only opportunity to confirm the score is after the referee has recorded the condition of the field at the end of the match. A team member, not an adult, must present any difference of opinion to the head referee. The referee will then confirm your final score. Once your team leaves the area and the competition table is cleared for the next team, you are no longer permitted to dispute the score. As in other competitions, the referee's ruling on the field is final. Graciously accept the referee's decision. When finished, collect all your robot parts.

At the conclusion of the first three robot rounds, some events hold elimination rounds while others may not.

FLL Judging

In addition to points scored during competition rounds, each team is judged on its robot design and programming, teamwork, and project presentation. Judges will ask questions, and team members need to articulate and demonstrate various aspects of their FLL experience during interviews and interactions with the judging panel. Also important to the judges is your team's knowledge of the science behind the Challenge, teamwork, demonstration of FLL values, and the influence of the team's mentors. The focus is on the team members and their ability to express

what they have learned.

Usually, teams meet with judges regarding specific awards for a designated time period. The most common format is individual sessions for Robot Design, Project Presentation, and Teamwork, although some teamwork judging is done by observing teams in action. Check with your tournament organizer to find out what format they use if it isn't mentioned in the tournament information materials.

In addition to evaluating teams during scheduled interview sessions, judges may also evaluate teams during conversations and observations in the pit and competition areas. These informal conversations are a wonderful opportunity for judges to hear unique stories and uncover exceptional qualities not readily apparent during the more formal judging sessions. The process is not meant to overwhelm the children, and you should encourage them to feel comfortable speaking with the judges. Judges realize the interview process is stressful for some kids.

To keep the schedule on target throughout the event, teams should arrive five minutes before their scheduled judging appointment. There is a break between each judging session so teams can travel to their next locations and judges can properly assess the previous judging session. A timekeeper typically ensures sessions remain on schedule.

How Judging Works

At Championship tournaments, FLL judges use a set of rubrics (see Appendix A) which represent qualities FLL considers important and useful for evaluating team performance. Judges also refer to a list of judging questions and may even add their own questions. The judges are volunteers, and they receive training from FLL or from the local FLL Partner before the event. Review Chapter 8: Awards and Judging Criteria in this handbook for awards criteria.

Adult Intervention

Remember that this is the team's opportunity to shine. Your role is to facilitate, and adult interference during the judging process is prohibited. A team's inability to answer questions, or make robot adjustments without the direct assistance of an adult, will be evident to the judges and may adversely affect your team's score.

It is often difficult for judges and event organizers to determine if the adults accompanying a team are coaches, parents, or both. Be sure that FLL's rules on adult intervention and gracious professionalism are communicated to all of the adults and children accompanying your team. The behavior of one person reflects on everyone associated with the team.

REMINDER

FIRST LEGO League is intended as a child-centered activity. As such, judges will only reward teams when children have clearly done the work themselves. Channel your enthusiasm positively, and use it to encourage your team!

Remember, the kids come first! When disappointments happen at a tournament, children take their cue from the adults around them. Please remember to model FLL values, honor what the kids achieve, and help them focus on those achievements.

In addition, the kids do the work! Judges will only reward teams where children show ownership of the completed work, including building, programming, and research. Judges are trained to recognize adult participation and may choose not to give your team credit if they observe or find evidence that adults did the work.

If judges or referees notice adults directing a team's performance, cuing the team, or prompting children, they may ask the adult to leave the immediate area. Some tournaments have restrictions on the number of adults that accompany children into the sessions. Please recognize that these rules are not designed to make the judging or performance process secret, but to ensure fair judging. Your team should be proud of all it has done in FLL, and you and other adults must trust the children to represent themselves.

Sometimes teams assume that another team could not have done the work they present without the direct involvement of adults. Remember that kids are remarkably creative, and some are highly sophisticated at programming or software applications for presentations. Don't assume that you know what a team is capable of, and don't let your team members make assumptions either.

Technical Judging

During the tournament day, technical judges will interview your team. The judges want to talk to your team members about the robot they built and the programs they wrote. They will address all of the questions directly to the team members, as the judges want to hear that the students did the work and understand what they did. They want to see and hear about any unique solutions or techniques the team came up with to solve problems. The judges want to know about the design process and what the team considers the best and worst parts of the robot. They want to know what sensors were used and why the team chose them.

TIP

Have a printed copy of your latest programs printed out to give to the judges. Choose a section that is easy to follow but highlights some difficult problem you overcame. If you're using ROBOLAB, please do not bring C-programming. Use icon-based programming instead. Make sure your team name and number are on the printout and use the comments feature of the software to note key portions of your programs.

In most cases, this is simply an interview, so you will not need any kind of presentation materials. Be advised that some events require formal presentations, so it's a good idea to call ahead or check the tournament website to find out what your tournament requires.

TIP

Have your team provide the technical judges with a one-page robot specification sheet. Include a picture, list of sensors used, interesting features, language used, and other critical information. When it comes time for the judges to pick winners, your specification sheet can help jog their memories.

Make sure the children can demonstrate the robot. Some tournaments have a table set up for this interview. If the team will be expected to run a mission on the Challenge field, pick a mission that is difficult and for which you have a good success rate. Finally, the judges may choose to visit teams in the pit and/or watch the competition rounds to further assess your team's robot capabilities.

Project Judging

REMINDER

Judges are volunteers who are generously giving their time. They may see as many as 15 presentations in one day with short breaks between teams. Try to make your team's project presentation short, snappy, to the point, and memorable.

Each team performs its project presentation before judges. In some cases only the team and coaches are permitted into the judging room, which may disappoint team parents. This may be due to space restrictions, or because some judges find the presence of spectators distracting. When your team enters the room, set up immediately as the judges may begin timing your presentation as soon as you enter. Have your presenters introduce the team and themselves and then start the presentation. After the presentation, there is usually a question and answer period with the judges.

Be sure that your team has rehearsed setting up and breaking down their presentation. They should not need adult assistance and should be able to do it themselves.

The most common mistake in project presentations is a presentation that exceeds the five-minute time limit. Some judges will interrupt your team and stop the presentation when time expires, others will sacrifice your team's question and answer period to compensate. Your team will not receive extra time for their session, so be sure that the kids plan accordingly.

Judges may interview your team as a whole or may interview team members separately, but in the same room. Have your team members prepared for this so they can best separate into groups.

When your team practices its presentation, use a checklist to determine that all three steps of the project are represented. The judges can only evaluate what they hear. Your team members must tell the judges how they shared their project with others, in order for the judges to credit them for doing it.

Q: My team kept individual journals and has many pictures documenting our season. We have plans to create a three-panel display for the tournament, but the kids are wondering what role the display serves in competition?

A1: Documentation is not specifically judged on its own, but it does add to the overall package. These materials go a long way to demonstrate the depth of your project research and teamwork to the judges.

A2: A tri-fold display is great for audiences visiting the pit. It can also help with interviews with judges.

Teamwork Judging

Some people think teamwork judging sessions should consist of observing the team in action, and others think that a full question and answer session gives a better overview of their team's work for the entire season. There are advantages to both judging formats, and FLL allows both types at the discretion of the tournament coordinators. Regardless of the format, the judges are evaluating your team on defined criteria outlined in the judging rubrics (see Appendix A: Rubrics). Prepare your team members for either format, and be sure they know how to demonstrate or articulate important points about their teamwork and ability to work together.

Tournament organizers may also choose to include an impromptu teamwork task in the interview sessions, so that judges can watch the team in action and include that observation in their initial evaluation.

Floating Judges

The tournament may have several judges walking around observing and visiting the pit and competition areas. Be sure to have at least one team representative at your pit table. Judges may not openly demonstrate who they are, but their ears and eyes are wide open. This is the time to remind your team and everyone associated with it about gracious professionalism. One helping hand to a team that forgot to bring something you have in abundance is worth a thousand cheers.

Awards Determination Process

During the end of the tournament, the judges work hard to choose the various award winners. This is by far the most difficult job of the day, and the judges take it very seriously. Every team is a winner, and yet the judges have to select one to receive special recognition. It can take some time for the judges to deliberate, and they make a great effort to be as fair as possible. Be patient during the deliberation period. This can be an ideal time for your team to pack up your pit table and displays and load up the cars to prepare to leave after the awards ceremony. Your tournament may choose to do a demonstration, have a special guest speaker, or run an exhibition round on the robot performance table to keep the crowd occupied during judges' deliberations. If your team will participate in an exhibition round, be sure that you don't pack up your robot!

If your team doesn't receive special recognition with an award, remind the kids of all the success and achievement that they have experienced over the season. Not every team can win an award. FLL is about an entire season, not just one day.

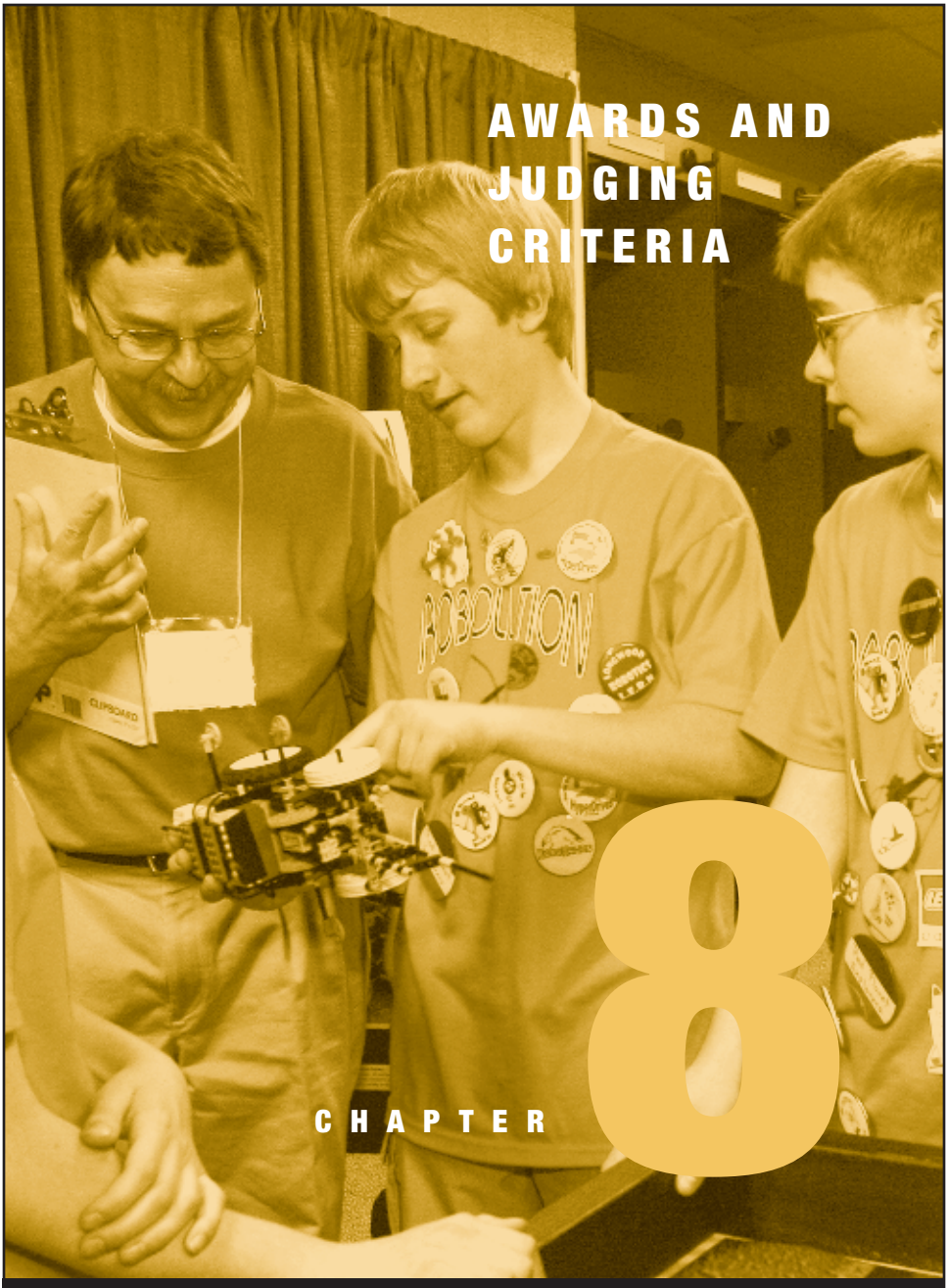
SNAPSHOT

From Dana Hobbs, FLL Partner

I stayed up all night setting up for the tournament. Anyone involved in *FIRST* and deadlines is familiar with sleep deprivation. You are running on pure adrenaline on tournament day. All the volunteers showed up, assignments were passed out, questions came to me from all directions, I moved from one location to take care of this and that... then ran here and there... people yelled my name all day, my radio constantly went off, the music was too loud, the pit was hopping with all the teams. It was pure organized chaos, and then all of a sudden, a dad grabbed me and gave me a huge hug and said, "Thank you, thank you, thank you! You have no idea how special today is to us." He squeezed me one more time and walked away singing... Wow! That made me take a step back and it made me think about what it took for all the teams to attend the event. I have no idea who he was, but needless to say, that was just the pill I needed. It was calming and put everything into perspective, not to mention a HUGE smile on my face and a little tear in my eye. *FIRST* does more than work with kids, it works on us "old folks" who are also proud to be a part of FLL!

The Closing Ceremony

Teams should return to the main competition area for the closing ceremony. Awards and medals are presented and teams are recognized for efforts demonstrated throughout the day. There is plenty of cheering, loud music, and smiling faces to end the tournament and celebrate the kids' accomplishments.



AWARDS AND JUDGING CRITERIA

CHAPTER 8

Most *FIRST* LEGO League teams participate in a tournament, or even several tournaments. The awards given at tournaments represent the special achievements of particular teams, but the real achievement for FLL teams occurs during the course of the season. For this reason, every child who participates at an FLL Championship tournament receives a medallion to signify the successful conclusion of an FLL Challenge season.

FLL AWARDS

The FLL Awards represent the highest achievement for FLL teams. Regardless of what country they are from or which Championship tournament they compete in, teams are judged using this group of awards that recognize a standard of excellence for all participants.

FLL divides the awards into four main categories:

- Technical
- Team Performance
- Special Recognition
- Judges' Awards

TIP

Please remember that not all teams can win an award at a competition. It is up to you to ensure that if your team members do their best, but do not win an award, they still know that they have succeeded. If you make winning an award the only standard for success, you diminish everything that a team accomplishes.

Each category contains several individual awards, and some larger competitions may offer second or third place awards in some categories. All Championship tournament organizers are required to present Technical and Team Performance Awards, but they may use their discretion when presenting other award categories.

Awards Eligibility

Award distribution is spread as equitably as possible among the teams, with the goal of no team winning more than two of the required (Champion's, Robot Design, Robot Performance, Teamwork, and Project Presentation) awards at a Championship tournament. A team can only win a second award if one of the awards they win is for Robot Performance.

This policy does not always apply to local events, which are not required to adhere to Championship tournament guidelines. It applies to special local-only awards at the tournament organizer's discretion.

To ensure fairness to teams and provide equal opportunity to win an award at a Championship tournament, teams are only eligible to win an award at the first Championship tournament they attend. Those teams who want to participate in multiple Championship tournaments do so for the purpose of being involved in the fun and excitement of the tournament experience, and not with the intention of receiving multiple awards. If your team participates in more than one Championship tournament, please use the honor system and notify the organizer that your team is not eligible for an award.

Objective vs. Subjective

Team achievement in Robot Performance is score-based, and the other award categories are judged. FLL tournament organizers train their judges and work hard to create a level playing field for all teams. The fact remains that judged awards are inherently subjective. We continue to improve tools and training for our judges, but over the years, FLL has developed judging processes that yield strong, consistent results.

Judging Normalization

We are often asked why we give out awards based on a normalized process rather than raw scores from initial judging sessions. It is critical that judging scores and evaluations be normalized before considering award winners. There are two reasons that analyzing all data and observations gathered during the entire tournament is the best way to determine awards. The first is that raw data doesn't allow for the data from call-back interviews, observation, or other information gathered during the rest of the tournament day. A team that does moderately well in the initial technical interview may later be interviewed again or observed on the performance table, and some truly outstanding aspect of their robot design or programming comes to the judges' attention.

The second reason that raw scores are unreliable is that there may be inherent differences in the way that different judges score. Even among the best-trained judges in all sports or activities, some individuals naturally score higher and others lower. The best way to use raw data is by

normalizing judging scores and evaluations. Some tournaments may use a numerical formula to normalize; others use the judging deliberation process created by FLL to achieve normalization. Either method results in a better, stronger judging process for all teams.

Judging Guidelines

For additional guidance on how judges assess your team, please pay careful attention to the rubrics (judging guidelines) found in Appendix A. Use them to your advantage. Pay close attention to the "good" and "excellent" categories in order to understand the definition of a reliable robot design, a creative presentation, and how to showcase your teamwork. Use these guidelines like road maps; figure out where you and your team are and how you can strive to achieve higher goals. You will find rubrics for Teamwork, the Project, and Robot Design. Share them with your team and adult mentors.

Awards List

Championship Tournament Awards

1. Champion's Award (formerly the Director's Award)
2. Robot Design Award
3. Robot Performance Award
4. Project Award
5. Teamwork Award

Recommended Awards

A. Outstanding Volunteer Award
B. Adult Coach/Mentor Award
C. Young Adult Mentor Award

Optional Awards (at the discretion of the FLL Partner)

A. Against All Odds Award
B. Rising Star Award
C. Team Spirit Award
D. Judges' Award

Champion's Award

The Champion's Award is the most prestigious award that any team can win. It celebrates the ultimate success of the *FIRST* mission and FLL values. It measures how the team members inspire and motivate others about the excitement of science and technology, solve problems, and demonstrate respect and gracious professionalism.

NOTE:
The Champion's Award is optional for local events and qualifiers.

To be considered for the Champion's Award, teams must perform well in both technical and team presentation categories, which are equally weighted.

The weight value for each of the categories is as follows:

TECHNICAL CATEGORY	
Robot Design	25%
Robot Performance	25%
TEAM PRESENTATION	
Project Presentation	25%
Teamwork	25%

Once teams are selected for consideration, judges convene and review the results of the teams' FLL values assessment, as well as their overall impressions of each team's performance and participation at the tournament. Using these additional parameters for determination, judges decide which team receives this highest honor. In most cases, the team that wins the Champion's Award is not eligible to receive any additional awards in the other categories, with the exception of the Robot Performance award.

TECHNICAL AWARDS

Robot Design Award

Judges look for teams whose work stands out for innovation, dependability, or both. To assess innovation, the judges watch the robots

work, looking for things that make them say “Wow!” They interview team members to reveal the less obvious unique and inventive ideas. To assess dependability, the judges interview the teams to learn what solid principles and best practices were used to reduce variability and errors, with preference to robots that are best able to “back it up” throughout the matches.

Tournaments may choose to break the Robot Design Award into two separate awards for programming and design, or three separate awards for programming, innovative design, and dependable design.

Robot Performance Award

This award goes to the team whose robot achieves the best score on the competition field or in the elimination round. There are several options judges use to determine the winner:

- If no elimination round is held, the team with the highest score from a single round receives the trophy.
- If elimination rounds are held, the team(s) whose robot achieved the highest score in the elimination round receives the trophy.
- If elimination rounds are held, the highest scoring team (using high score between two teams as the factor for advancement to the next round) receives the award.

TEAM PRESENTATION AWARDS

Project Award

FLL presents the Project Award to the team whose quality research, innovative solutions, and creative presentation best reflect an in-depth understanding of the various scientific disciplines and issues involved with the Challenge project.

Judges look for the team’s ability to have as many team members as possible participating in the presentation. Judges assess how your team does the following:

- Clearly defines a question to guide their research
- Clearly and accurately outlines and understands all aspects of the problem

- Addresses the potential impacts if the problem is not resolved
- Captures the judges' attention with the team presentation
- Presents the team solution, and shows how it assists in resolving the problem
- Shows creativity and innovation in its solutions
- Shares their project with others

Tournaments may choose to break the Project Award into three separate awards:

Research Quality – The use and understanding of diverse resources to formulate an in-depth and thorough explanation of the team's point of view and solution to the Challenge project.

Innovative Solution – Thought-provoking and innovative resolution, including how and why it was chosen.

Creative Presentation – An imaginative, creative presentation demonstrating the team's research and solution.

Teamwork Award

Teamwork is critical to succeed in *FIRST* LEGO League and is the key ingredient in any team effort. FLL presents this award to the team that best demonstrates extraordinary enthusiasm, an exceptional partnership, and the practice of FLL values. For more information, refer to the Teamwork rubric. The team receiving this trophy demonstrates the following attributes to the judges:

- Confidence, energy, and enthusiasm
- Group problem-solving skills
- Understanding of and respect for others
- Positive team interaction and group dynamics
- Demonstrated interest in science and/or technology
- Ability of team members to fill each other's roles when necessary

SPECIAL RECOGNITION AWARDS

The success of the FLL program is a reflection of the commitment and enthusiasm our volunteers display.

Outstanding Volunteer Award

This award honors the dedication of the volunteer(s) whose assistance and devotion helps change the lives of children in a positive way. FLL relies on volunteers for every aspect of the program. Some volunteers do truly extraordinary things for the kids.

Adult Coach/Mentor Award

Many teams reach significant milestones of success thanks to their close relationship with an adult mentor. This award goes to the coach or mentor whose wisdom, guidance, and devotion are most clearly evident in his team's discussion with the judges.

Young Adult Mentor Award

FLL presents this award to the young adult, high school or college mentor whose support, impact, inspiration, and guidance are most clearly evident in the team's discussion with the judges.

OPTIONAL JUDGES' AWARDS

Against All Odds Award

This award goes to the team that improvises and overcomes a difficult situation while still making a respectable showing, and with an attitude that shows, "We can overcome incredible odds if we never give up, no matter what!"

Rising Star Award

At every tournament, there are teams that the judges notice and believe will soon be among the best and the brightest. The Rising Star

Award recognizes a team that the judges believe stands out and that we expect great things from in future Challenges.

Team Spirit Award

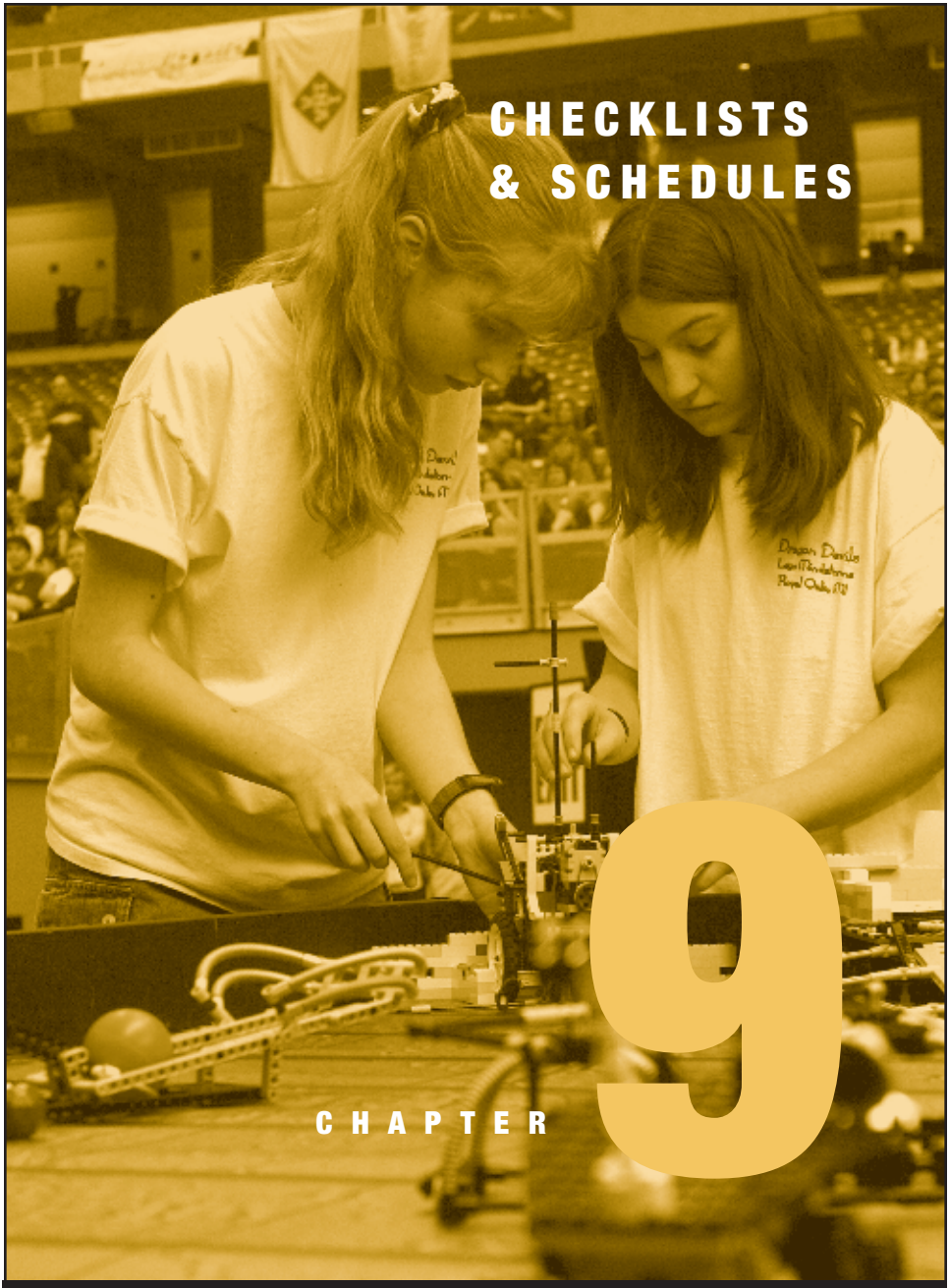
Some teams really know how to have fun. This award goes to the team that most enthusiastically demonstrates a commitment to getting others to see how accessible, fun, and rewarding science and technology can be, especially when you are part of a great team.

Other Judges' Award

During the course of competition the judges may encounter a team whose unique efforts, performance, or dynamics merit recognition. Some teams have a story that sets them apart in a unique way. Sometimes a team is so close to winning an award that the judges choose to give special recognition to the team. This award gives the judges the freedom to recognize the most remarkable teams for which a standard award does not exist.

Local Awards

Tournaments may also offer local awards, with criteria created by the tournament organizers. Please ask your tournament organizer for more information on any local awards.



CHECKLISTS & SCHEDULES

CHAPTER 9

PRE-SEASON THROUGH TOURNAMENT CHECKLIST

Team Checklist

Starting a new team takes a lot of organization. This is a suggested to do list for new teams. The information may also provide suggestions and reminders to returning teams.

Before the Season Starts

- ___ Find a meeting place
- ___ Meet with site host
- ___ Create a meeting schedule
- ___ Determine how the team will cover its costs
- ___ Find sponsorship
- ___ Determine which computer(s) the team will use
- ___ Set up a competition area
- ___ Build an FLL table, if desired
- ___ Purchase supplies, i.e., batteries, tackle boxes
- ___ Purchase a 3-ring binder to store important papers and handouts
- ___ Review FLL values and gracious professionalism

Team Logistics and Preparation

- ___ Learn as much as you can about FLL
- ___ Have team choose a team name
- ___ Participate in the forum on the FLL website(firstlegoleague.org)
- ___ Obtain curriculum resources from the *FIRST* website(usfirst.org)
- ___ If possible, hold the first meeting before the season begins
- ___ Send a note home to parents requesting team members' emergency and medical information
- ___ Prepare a 3-ring binder for research, design ideas, and judging information
- ___ Schedule technical mentors or specialists
- ___ Schedule weekly preparation time
- ___ Build a practice robot
- ___ Install software on computer(s)
- ___ Make sure the computer and controller communicate
- ___ Write a simple program, download to the robot, and test it
- ___ Print Challenge rules, point structure, and rubrics
- ___ Print Challenge building instructions and rules
- ___ Have team brainstorm for Challenge solutions
- ___ Have team begin brainstorming and working on the Project
- ___ Have team work on Challenge missions
- ___ Have team design team T-shirt and/or button with team's logo

Success Tips for Learning and Teaching

- ___ Use team meeting time for training sessions
- ___ Run team-building exercises
- ___ Learn the basics of making a robot go
- ___ Add sensors to your robot and try simple programming challenges such as the Try It examples in Chapter 4
- ___ Teach, or find someone to teach, basic mechanical principles: gears and gear ratios, building with cross braces, and building so the robot does not fall apart

Pre-tournament Preparation

- ___ Plan for extra meetings to prepare for the tournament
- ___ Publicize your team and the event sponsor
- ___ Run a robot and your project presentation as a practice session
- ___ Invite an audience for a dress rehearsal

Tournament Logistics

- ___ Go to the FLL website (firstlegoleague.org) for tournament information
- ___ Apply for an event
- ___ Determine whether you need to attend a qualifying tournament first
- ___ Review adult intervention policy in Chapter 7: The Tournaments
- ___ Obtain information about event start and end times and logistics
- ___ Collect Consent and Release forms from all students and mentors
- ___ Prepare team introduction pages

Tournament Checklist

- ___ Robot
- ___ Signed Consent and Release forms
- ___ Parts kit
- ___ Print out of programs
- ___ Materials needed for project presentation
- ___ Laptop computer with batteries and/or AC adaptor
- ___ Team scrapbook
- ___ Extra batteries
- ___ Team banner, posters, or other paraphernalia
- ___ Lunches and drinks
- ___ Storage box for personal items
- ___ IR tower or USB cable
- ___ Programming garage
- ___ Team introduction pages

SAMPLE SCHEDULES

FLL SEASON

May:	Team registration and materials ordering begins
June:	Robot Kits and *Coaches' Handbooks* begin to ship
Mid-August:	Field Setup Kits begin to ship
September:	Tournament details posted on FLL website
Mid-September:	Challenge announced
End of September:	Team registration closes and team profile and contact information must be updated for the season
October:	Championship tournament applications accepted (Approx. 2 weeks)
November – January:	Local events and Championship tournaments

Week-by-Week Milestones

Prior to Kickoff (if possible):

Challenge: Open your FLL Robot Kit and experiment with *FIRST* website (usfirst.org) tutorials. Build a robot. Try to program it to go a certain distance, turn, and maybe climb a book.

Project: Do some background research on how robots are used by scientists who work in this year's field. For example, if the theme is the ocean, you might do some background research on how researchers and others use underwater robots.

Kickoff Week 1:

Practice team-building exercises, choose team name, establish team member roles, and establish seasonal goals.

Challenge:

- Begin constructing your mission models from the instructions contained on the CD in the Field Setup Kit.
- Print all Challenge web documents, and give to team members to read carefully.

Project: Brainstorm project ideas with your team.

Week 2:

Challenge:

- Continue to build your mission models.
- Make sure practice field is set up.
- Check the Challenge Q&A on the FLL website (firstlegoleague.org) for game-related updates.
- Everyone, including a few designated experts on those documents, reads the Missions and Rules.
- Finish your selected tutorials and then experiment with chassis designs and simple programming tasks. Brainstorm possible mission strategies and associated robot designs.

Project: Select a project topic to focus on and begin doing your research. Keep in mind that research might be done at the library, on the Internet, or by conducting interviews with people in your community or, most likely, all three.

Week 3:

Check Q&A.

Challenge: Design and program the robot to perform the two missions that the team considers the easiest. Consider designs and strategies for expansion to other missions.

Project: Continue research and decide on a presentation format.

Week 4:

Check Q&A. Agree on reasonable goals for the season (examples: "Just have fun," "Not be last," "Get our mission in the local paper," "Do half the missions perfectly every time," "Do two missions like no one else," "Incorporate at least one idea from every team member," "Make people laugh").

Challenge: Design and program the robot to achieve at least half of your team's goals related to it.

Project: Begin writing a script and creating any presentation materials needed.

Week 5:

Check Q&A again. Reassess goals. Team experts on the Missions and Rules documents should ensure that all intended scoring strategies are legal and worth points.

Challenge: Try to meet 75% of robot-related goals, even if they are not complete.

Project: Finish writing script and do the necessary research to fill in any gaps. Continue working on the visual aids and any props you will need for your presentation.

Week 6:

Check Q&A again. Reassess goals. Save copies and back up your programs.

Challenge: Try to meet 75% of robot-related goals and increase reliability.

Project: Put the finishing touches on visual aids and begin rehearsing the presentation.

Week 7:

Check Q&A again. Finalize goals – By this time the team probably knows what it wants and what it's capable of, and the final goals are meaningful and realistic. Save copies and back-up programs.

Challenge: Try to meet all robot-related goals, most of the time. Test in different lighting conditions. Understand effects of a battery change.

Project: Rehearse! Use a stopwatch to make sure you're staying under the five-minute limit. Practice setting up and cleaning up. Practice responding to questions from the judges.

Week 8:

Check Q&A for the last time.

Challenge: Complete fine tuning. Make sure that all robot-related goals can be met consistently

Project: Fine tune and make sure that you can consistently meet all goals such as timing and presentation skills.

SAMPLE TOURNAMENT SCHEDULE

8:00-9:00am	**Team Registration**	**Building Entrance**
8:00-9:00	**Team Setup**	**Pit Area**
9:00-9:15	**Coaches' Meeting**	**Auditorium**
9:30-10:00	**Opening Ceremony**	**Gymnasium**
10:15-10:30	**Teamwork Judging Session**	**Judging Room 1**
10:50-10:55	**Round 1**	**Gymnasium**
11:10-11:15	**Round 2**	**Gymnasium**
11:44-12:00pm	**Technical Judging Session**	**Judging Room 2**
12:00-12:30	**Lunch**	**Cafeteria**
12:45-1:00	**Project Judging Session**	**Judging Room 3**
1:20-1:25	**Round 3**	**Gymnasium**
2:00-3:00	**Top 16 Elimination Rounds**	**Gymnasium**
2:00-3:45	**Possible Judge Callbacks/Final Judging**	**Judging Rooms**
3:00-3:45	**Team Packup**	**Pit Area**
4:00-5:00	**Closing Ceremony**	**Gymnasium**

APPENDICES A & B

APPENDIX A: RUBRICS

APPENDIX B: ADDITIONAL RESOURCES

ROBOT DESIGN RUBRIC

	Needs Improvement	Fair	Good	Excellent
Innovative Design	• Design, drive train, and structure are standard. • Manipulators/sensors used in expected ways. • Strategy for combining missions expected. • Programming written as expected.	• Design creative, unique use of drive train or structure. • Manipulators/sensors used in unexpected ways. • Unique/creative strategy for coordinating missions. • Programming tasks used in unexpected ways. (For this category, 1 of the 4 above is demonstrated.)	• Design creative, unique use of drive train or structure. • Manipulators/sensors used in unexpected ways. • Unique/creative strategy for coordinating missions. • Programming tasks used in unexpected ways. (For this category, 2 of the 4 above are demonstrated.)	• Design creative, unique use of drive train or structure. • Manipulators/sensors used in unexpected ways. • Unique/creative strategy for coordinating missions. • Programming tasks used in unexpected ways. (For this category, 1 done exceptionally or 3 of 4 above demonstrated.)
Strategy, Process, Problem-Solving	• Uses standard design. • No design process (from initial concept through build, test, refinement) communicated. • Strategy based only on ease of task - did not maximize time, combine mission tasks, or consider points.	• Some forethought in initial design. • Refinement of robot and programs not communicated. • Strategy often based on ease of task - few risks taken. • Some consideration of time, mission combinations, or maximizing points.	• Basic understanding of design process, evidence of conceptual planning, building, testing, refining of robot, manipulators, programs. • Effective strategic planning, combining mission tasks, plotting routes, using manipulators, and/or program slots.	• Communicates complete design process, from initial concept through build, test, and refinement. • Excellent/innovative strategy, combining mission tasks, plotting routes, maximizing points.
Locomotion & Navigation	• Difficulty going same distance on repeated missions. • Too fast for accuracy, or too slow to accomplish mission. • Turns inaccurate or inconsistent. • Moves between two points inconsistently. • No effort to know position on table beyond distance and accurate turns.	• Goes defined distances sometimes. • Turns sometimes accurate. • Sometimes moves between two points consistently. • Little or no effort to know position on table beyond distance and accurate turns.	• Goes defined distances most of time. • Not too fast for accuracy or too slow to accomplish mission. • Turns reasonably accurate and consistent. Allows for variables. • Moves between two points with reasonable accuracy and consistency. • May use various sensors.	• Goes defined distances efficiently. • Adjusts speed, position sensing for optimum speed and accuracy. • Turns accurately and consistently. • Allows for variables (battery wear, obstacles). • Moves between two points with very good accuracy and consistency. • May use various sensors.
Programming	• Programs disorganized • Programs inefficient • Results unpredictable • Sensors absent or inadequately used	• Programs somewhat organized • Programs efficient at completing some tasks • Results somewhat unpredictable	• Programs organized • Programs efficient at completing most tasks	• Programs logically organized • Programs very efficient • Programs always work, even for complex tasks

Programming cont.	• Programs do not accomplish expected tasks • Variables, loops, subroutines, and conditions defined but unused • Kids can't describe what run will do.	• Programs do some of what is expected • Variables, loops, subroutines, and conditions, if used, not understood.	• Programs do what they're expected to do • Sensors used effectively • Variables, loops, subroutines, and conditions, if used, are needed • Kids can describe most of mission.	• Use of sensors guarantees certain actions in every trial • Programs work in competition as in practice • Variables, loops, subroutines, and conditions, if used, are effective • Kids can describe mission and reference the program.
Kids Did the Work	• Little knowledge of why some parts are located as they are on the robot. • Little or no understanding of what pieces did. • Building/programming appears primarily done by coach.	• Knowledge of robot structure and programming show minimal understanding of underlying design, science, and technology (age-specific expectations). • Building and programming seems primarily directed by coach.	• Knowledge of robot structure and programming show moderate understanding of underlying design, science, and technology (age-specific expectations). • Building/programming mostly directed by team members, with help from coach.	• Knowledge of robot structure and programming show thorough understanding of underlying design, science, and technology (age-specific expectations). • Building/programming was done by team members.
	Okay for team members to have different roles, as long as work is done by kids.			
Structural	• Difficulty with robot assembly during demo. • Base weak, falls apart when handled or run. • Attachments, if used, weak and fall apart often; difficulty completing task; or overly complex. • Robot design from book, little modification by team.	• Robot assembly done with few errors. • Robot base structure has some stability. • Attachments, if used, difficult to apply; and/or not modular; not precise or not repeatable. • Robot shows signs of team's design ideas.	• Slow robot assembly, with no errors. • Robot base stable, but not robust. • Attachments, if used, modular; function most of the time; and/or take some time to assemble; somewhat precise and/or repeatable. • Robot designed by team	• Robot assembles easily. • Robot base stable and robust. • Attachments, if used, modular; function as expected; and easily added/removed from robot. • Robot displays wide range of capabilities. Attachments, if used, perform tasks extremely well and are repeatable. • Robot designed by team; design is unique and creative.
Overall Design	• Robot lacks most critical design components: works, stays together, efficient parts use, attachments easy to add/remove, simpler than comparable robots. • Few components work together; few components look like they belong together.	• Robot lacks many critical design components: works, stays together, efficient parts use, attachments easy to add/remove, simpler than comparable robots. • Some components work together; some components look like they belong together.	• Robot lacks some critical design components: works, stays together, efficient parts use, attachments easy to add/remove, simpler than comparable robots. • Most components work together; most components look like they belong together.	• Robot is elegant, complete system. • All components work well together. • All components look like they belong together.

PROJECT RUBRIC

	Needs Improvement	Fair	Good	Excellent
Question, Language Use	• Presentation rambles • Lack of coherent arguments • No clearly defined question • Team member ideas not integrated	• Research question is vague • Research question is implied • Organization elements are present, but weak logical flow • Team member ideas not well-integrated	• Research question is fairly clear and concise, but could use a little tweaking • Main point is clear • Goals are articulated • Group effort is seamless • Presentation outline is clearly evident	• Organized — clear beginning, middle, and end • Persuasive arguments and examples • Research question is concise and clear • Question is stated directly and explained • Presentation shows logical thought progression • All elements are relevant and well-integrated • Appendices included, if relevant
Completeness, Teamwork	• One team member doing all the work • No evidence for conclusions • No position on issues • Unable to answer judges' questions • Excessive adult intervention (help from mentor/coach)	• Less than 1⁄2 team doing work • Project not fully understood • Arguments obscured by jargon • Insufficient data • Incomplete analysis • Inferences unsupported • 1⁄2 team able to answer judges' questions • Adult intervention is apparent	• 3⁄4 team doing the work • All aspects of assignment carried out • Good use of technical terms • Evidence is clearly presented • 3⁄4 able to answer judges' questions • This project is clearly the work of the children	• All team members participating • Original data carefully documented • Team provides judges with more than the assignment requires • All students are able to answer the judges' questions • This project is clearly the work of the children
	⬇	⬇	⬇	⬇

Background, Data & Graphics	• No outside sources (books, websites, magazines, etc.) used • Personal opinion treated as universal • No visual aids • Presentation has no link to your research question	• Very limited outside sources — only one source or type of source cited • Credit to sources not given • Inappropriate use of sources • Link to research question is vague • Outside sources misinterpreted	• Good sources • Credit is given to others when due • Supporting printed materials provided to judge(s) • Visual aids support research question	• Books, periodicals, and websites cited (variety) • Credit given clearly when due • Supporting printed material given to judge(s) • Visual aids clearly support research question • Visual aids are carefully chosen
Analysis & Conclusions	• No relevance to FLL Challenge theme • Lacking personal reflection • Alternate views ignored	• Relevance is unclear • Alternate views dismissed • Conclusions are vague, unsupported	• Personal relevance and relevance to FLL theme is clearly stated • Implications have been considered • Students take firm, articulate stand • Awareness of differing views	• Conclusions are clearly supported by data • Analysis clearly relates to research question • Clear, well-supported position on issues • Alternative views considered • Relation to personal experience is explained • Original, important insights are shared
Style	• Many errors • Too long/short • Not rehearsed • Plagued with technical difficulties • Excessive computer sound/ visual effects	• Presentation seems rushed or unrefined • Few errors • Too long/short • Semi-rehearsed • Plagued with technical difficulties	• Well-edited • Proper length • Well-rehearsed • Very minor tech difficulties • Creative format	• Creative, imaginative • A joy for the audience — humor, personal touches • Model of clarity & good speaking • Well-rehearsed • No technical difficulties • Clever choice of presentation style

TEAMWORK and FLL VALUES RUBRIC

	Needs Improvement	Fair	Good	Excellent
Roles & Responsibilities	• No clearly defined roles • Not clear who completed which tasks • Very uneven distribution of work • Time management is poor or purely directed by the coach	• Loose role assignments • Uneven work distribution • Time management skills are weak	• Clearly defined roles • Team members understand each other's roles, but focus on their own • Work is distributed fairly • Team members will help each other, if asked • Team mentions learning time management	• Clearly defined roles • Team members understand each other's roles • Team members can fill each other's roles (happily!), if needed • Workload is distributed fairly • Team members assist each other without being asked • Team members give concrete examples of learning time management
Gracious Professionalism	• Team members show little/no respect for each other • Team members show no awareness of school/community issues • Team members compete with each other to be heard during judging • Team doesn't understand the concept of gracious professionalism	• Team members show limited respect for each other • Team members show limited awareness of school/community issues • Team is aware of gracious professionalism, but gives no concrete examples of what they have done to help others	• Team members show respect for teammates • Team members imply increased awareness of school and/or community • Team members are vague about how this awareness translates into other aspects of their lives • Team implies that they have helped each other/other teams	• Team members give concrete examples of respect for teammates • Team members show increased awareness of their school/community • Team members clearly discuss how this increased awareness translates into other areas of their lives • Team members give concrete examples of how they have helped each other/others
...Team Dynamics	• A problem was identified, but no steps were taken to identify a solution • One team member used power to reach their desired outcome	• A problem was identified, but the chosen solution was inadequate to some team members • Some team members didn't accept the solution	• A problem was identified and there is compromise evident in the solution • Team tested various solutions to solve the problem • Cooperation is a dominant theme	• A problem was identified and the team worked together to find a solution • Various solutions were tested and then incorporated • Team is willing to accept input

Problem-Solving & ...	• One person's ideas are used • Team members working against each other • Coercion and/or confrontation dominate	• Simple majority had input at meetings • Decisions made by simple majority without collaborative discussion • Coexistence is a dominant theme	• Team focuses on individual tasks • Decisions made by most of the team	• Collaboration and co-ownership are dominant themes • Team members show equality and value each other's roles • Group sees the big picture and overall goals • Members recognize inter-dependence • Decisions made by the entire team
Confidence & Enthusiasm	• Only one team member spoke to the judge(s) • Some team members seem disinterested	• About 1⁄2 the team spoke to the judge(s) • About 1⁄2 the team seems interested	• Everyone was ready to answer at least one question from the judge(s) • Most of the team appears excited and interested	• All team members show confidence in themselves as well as the team • Members work together to include each other • Concrete examples of enthusiasm are shown • Team members show equal investment in FLL • All team members speak to the judge(s)
FLL Values	• No clear enthusiasm for science, engineering, or technology • Team doesn't mention new skills acquired	• Some members show an interest in science, engineering, or technology • Limited attention paid to new skills acquired	• Team shows a keen interest in subject matter, but limited use of concrete examples • Team implies new skills acquired	• Group articulates a clear understanding of FLL • Team gives concrete examples of their interest in the subject areas • Team clearly talks about new skills acquired.

Useful Books

Duckworth, Eleanor. The Having of Wonderful Ideas & Other Essays on Teaching and Learning. New York: Teachers College Press, 1996.

Erwin, Ben. Creative Projects with LEGO MINDSTORMS. Boston: Addison-Wesley Professional, 2001.

Ferrari, Mario, Ralph Hempel, ed., Giulio Ferrari. Building Robots with LEGO MINDSTORMS. Syngress Publishing, 2001.

Wang, Eric. Engineering with LEGO Bricks and ROBOLAB. 2nd ed. Knoxville: College House Enterprises, LLC, 2004.

Program-Specific Information

www.usfirst.org
This is the primary site for providing an integrated presentation of FLL within the context of *FIRST*. Be sure to check here for curriculum, programming and building links, and information to share with sponsors.

www.firstlegoleague.org
This site provides all in-season communication such as the annual Challenge kickoff, event information, and forum discussions.

Fundraising Resources

www.fundraising-ideas.org
Loads of fundraising ideas

www.fundraiserhelp.com
Fundraising ideas and resources

www.stepbystepfundraising.com

Programming and Building Advice

www.ceeo.tufts.edu
Tufts University Center for Engineering Educational Outreach (CEEO)

www.legoengineering.com

www.education.rec.ri.cmu.edu
Carnegie Mellon National Robotics Engineering Center

LEGO Parts Resources

www.legoeducationstore.com/catalog.cfm
LEGO Education Division

www.bricklink.com
Unofficial LEGO Marketplace

www.guide.lugnet.com/partsref
Partsref: A LEGO Elements Catalog

General Engineering & Career Resources

www.jets.org
Junior Engineering Technical Society

www.kids.gov/k_careers.htm
Lots of links with career information for kids

www.robotics.nasa.gov
NASA Robotics Alliance Project

www.engineergirl.org
Created by the National Academy of Engineering

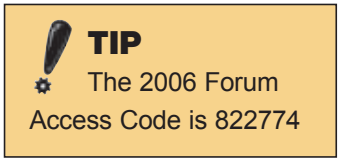
FLL Support

Product Billing, Shipping, Invoicing:	
LEGO Education (U.S. teams)	
Phone:	1 800 362 4308
Fax:	1 888 534 6784
E-mail:	fllhelp@pitsco.com
Address:	LEGO Education PO Box 1707 Pittsburg, KS 66762-1707
Spectrum Educational Supplies LTD (Canadian teams)	
Phone:	1 800 668 0600
Fax:	1 800 668 0602
E-mail:	fll@spectrumed.com
Address:	SPECTRUM Educational Supplies Ltd. 150 Pony Drive Newmarket, Ontario L3Y 7B6 Canada
Damaged or Replacement LEGO Pieces:	
E-mail:	Go to www.LEGO.com, click on Customer Service
Phone:	1 800 422 5346
Questions on Challenge Missions and Rules:	
E-mail FLL Engineering:	flltech@usfirst.org
FLL Engineering:	1 800 871 8326
LEGO MINDSTORMS Software (NXT, ROBOLAB and RIS) Support:	
E-mail:	support@legoeducation.com
Phone:	1 866 349-LEGO or 1 866 349 5346
General FLL Program Support, Registration, Teams, Tournaments:	
FLL Team Support & General Information:	1 800 871 8326
E-mail:	fllteams@usfirst.org
FLL websites:	www.usfirst.org www.firstlegoleague.org
FLL Partner Information:	Go to the “Teams and Tournaments” page on www.firstlegoleague.org to locate local contact information

Forum Uses and Location

We strongly encourage teams to participate in the FLL International Forum found on the FLL website. The forum is a bulletin board where users can post questions and read and reply to existing messages. The forum is not an instant messenging system, nor is it a chat system. Disclaimer: the forum is intended for team use only and is not a source for official FLL postings or replies.

Teams use the forum to get advice about participating in FLL, learn how other teams are approaching the Challenge, exchange technical information, and socialize. Everyone benefits from the free flow of FLL-related information.



Examples: need help with a rotation sensor? Can't seem to follow a line? Need help finding that elusive software bug? Run out of fundraising ideas? Having trouble keeping team members focused? Does your team have a strategy you are worried about? Want to learn what a French team is doing for its project? Want to share a neat trick you just learned? Looking for teams to join you for a tune-up tournament?

FLL Forum Requires Adult Supervision

An adult must be present at all times while team members are viewing the web forum. More importantly, you, or another adult are responsible for closely monitoring all team member submissions. FLL and the LEGO web administrator reserve the right to prohibit access to any team not utilizing the forums appropriately.

Post Clearly

The forum is organized in a directory structure and each area targets specific discussion types. Prior to your first posting in the forum, it is important to view the forum tutorial or "Quick Start Guide." Be sure to always put thought and effort into the wording and placement of your question or discussion topic. A well-posed and appropriately placed question is more likely to receive useful and informative replies.

When you post a question, it becomes a permanent entry in the forum. Other users will log in at their leisure, see your team's posting, and may respond to it if they have a comment or solution. You may get an answer in just a few hours or you may have to wait a day or two.

Use Specific Headers

On the forum, the first few words of the first sentence become the subject line in the outline view. Make those words meaningful to pinpoint your topic. Your subject line should reflect your question well enough that others searching the forum with a question similar to yours will be able to follow the thread to an answer rather than having to post the question again.

FLL Forum Access Code and Setup Instructions

To obtain access to the forum each year, all teams must go to the Forum Login Page and set up an account.

1. Click on the "Set up an account to access the Forum" link under NEW USER (Right side of page).
2. Enter the forum access code from the previous page of this handbook. You will use this access code only once to access the user account setup page.
3. Complete the required fields and select your own private password. We strongly recommend that a team reuse the personal password selected when completing the online team registration. Use your private password in all following visits to the forum.
4. Once you have successfully completed your user account page, you can post your own discussion or view and participate in current discussions. In addition, the team's name will appear on a list of forum participants on the "Teams and Tournaments" area of the website. Have fun!

Kickoff Documents

The Challenge is unveiled in September. The Challenge and associated materials will be available on our website at **www.firstlegoleague.org.** The Challenge materials are provided as portable document format (PDF) files.

Robot Game Related Documents

Important - All teams must read, understand, and refer to the following four main areas that define the "robot game" portion of the Challenge. Information from all four of these sources will serve as the basis for referee decisions and performance scoring.

1. **Field Setup Instructions**
   The specifics about the placement, operation, and care of the field mat and mission models are provided in the field setup instructions. (Instructions for building the mission models themselves are found on the CD that comes in the Field Setup Kit).
2. **Rules**
   The rules define what to expect at a competition, the exact boundaries the team and robot must conform to, and how the referee will govern the action.
3. **Missions**
   The missions identify exactly what results your robot must achieve on the field to earn points in performance.
4. **Questions and Answers (Q&A) — Web Postings**
   Q & A pertaining to clarifications, new or previously missing information, and early referee decisions will be posted throughout the season, so check this area of the site often.

The Project

Project Assignment

The project assignment will outline the expectations for the project. The project gives teams the background information they need to understand the Challenge missions, and it is a part of the judging process for qualifying and Championship tournaments.

Links to useful websites are included as resources for the project.

SAMPLE PRESS RELEASE

FOR IMMEDIATE RELEASE

> **TIP**
> A sample press release is also available electronically on the *FIRST* website under "FLL Communications Resource Center."

CONTACT: (NAME)
(PHONE)
(EMAIL)
(LOCATION) "(Challenge Name)"

Teams solve real-world problems through robot design and research at ***FIRST*** LEGO® League (EVENT NAME), (DATE), (CITY, STATE). Children from (#) states and the (CITY) area have been tasked with the challenge and excitement of designing and building an original robot in the ***FIRST*** LEGO® League program (www.firstlegoleague.org). This weekend, at (VENUE LOCATION), eight weeks of research and design will culminate in the ***FIRST*** LEGO® League (TOURNAMENT NAME) where teams of children and mentors will demonstrate their problem-solving skills, creative thinking, teamwork, competitive play, sportsmanship, and sense of community. Among the participants are the 9-14 year-old boys and girls of Team # (XXX) from (YOUR TOWN), also known as (TEAM NAME). This action packed event is free and open to the public.

This year's Challenge, "(CHALLENGE NAME)", calls for teams to research and present robotics technology solutions (INSERT THEME OF CURRENT CHALLENGE). The competition is judged in five areas: research and presentation; robot performance; technical mechanics of the robot's construction; teamwork; and gracious professionalism. The highest honor will go to the team that best exemplifies the spirit and values of the program. Every participant will receive a medallion to commemorate his experience and dedication to the eight-week process.

Founded by inventor Dean Kamen, ***FIRST*** (For Inspiration and Recognition of Science and Technology) was created to inspire young people's interest and participation in science and technology. ***FIRST*** LEGO® League is an international program for 9 to 14 year-old children created in a partnership between ***FIRST*** and The LEGO Company in 1998. Each September, ***FIRST*** LEGO® League announces the annual Challenge to teams, which engages them in authentic scientific research and hands-on robotics design. Using LEGO MINDSTORMS™ technologies and LEGO bricks, children work alongside adult mentors to design, build, and program robots to solve real-world challenges. After eight intense weeks, the competition season culminates at high-energy, sports-like tournaments.

Since its beginning, ***FIRST*** has had a positive impact on students and academic communities. "We need to show kids that it's more fun to design and create a video game than it is to play one," said Dean Kamen, ***FIRST*** founder. "In ***FIRST*** LEGO® League, kids discover career possibilities and learn to make positive contributions to society." Currently in its eighth year, the ***FIRST*** LEGO® League anticipates its largest season ever with over (#) kids from around the world competing in qualifying events and tournaments.

ABOUT *FIRST*

Accomplished inventor Dean Kamen founded ***FIRST*** (For Inspiration and Recognition of Science and Technology) in 1989 to inspire an appreciation for science and technology in young people. Based in Manchester, NH, ***FIRST*** designs accessible, innovative programs to build self-confidence, knowledge and life skills while motivating young people to pursue opportunities in science, technology, and engineering. With the support of many of the world's most well-known companies, the not-for-profit organization hosts the ***FIRST*** Robotics Competition for high school students and the ***FIRST*** LEGO® League for children 9-14 years old. To learn more about ***FIRST***, go to www.usfirst.org

APPLIED ENGINEERING TERMS & CONCEPTS

This section is included to help your team adopt and understand some engineering terminology — with an emphasis on how the terms apply to the FLL experience of building and programming LEGO robots. Try to use these terms and concepts at the beginning of the process and add others when opportunities present themselves.

Arbitrary

An arbitrary decision is one that is not made analytically, but is based on personal taste or style. Arbitrary decisions in robot design are normally about characteristics that do not affect how the robot performs, such as color.

Autonomous

A robot is said to be autonomous if it is programmed to operate on its own, with no remote control.

Bias

When you hear someone else's idea about something before you have had a chance to think about it for yourself, you are biased. When you are biased, your capacity for original thought is reduced.

Brainstorming

This is a process for generating many varied ideas. One method: a person stands at the front of the room and records everyone's ideas until no one can think of any more ideas. What seems like a crazy idea at first is often seen to have possibility later.

Center of Mass

An object's center of mass is an internal spot under which the object could be balanced.

Circumference

This is the length around the edge of a circle.

Clarifying the Problem

It is important in any problem solving exercise to hear the wording of the problem for what it is, break the problem down, and focus on the real desired outcome.

For example: Someone hands you a tennis ball and challenges you to get the ball in a crate on the ground about 80 feet away. Do you take the challenge? Do you ask how many bounces are allowed? Do you worry if you can throw that far, or how your aim is, or how many shots you get? No! You clarify the problem in terms of the desired results, walk to the crate, and drop in the ball.

In this example, the actual problem was "get the ball in the crate." No one said it had to be thrown. No one said it had to be done from where you were standing. Do not add unnecessary restrictions to the solution approach, and do not take it for face value that you can only do things as they have been done before.

Control

A process under control is one for which you can set parameters, and predict the process outcome. Systems with a lot of variability in them are not under control.

Dead Reckoning

A robot is said to navigate by dead reckoning if it is relying on sensors that cannot detect features of the playing field, or if it is relying on no sensors at all.

Drive vs. Driven

The drive component is the one where torque is coming from, and the driven component is linked to the load.

Dynamic
Changing over time.

Efficiency
An efficient solution is one that works without wasting time, material, or energy.

Energy
This is the ability to do work.

Engineer
Engineers study the sciences and use knowledge to manipulate energy and materials to solve problems and to produce the products and systems we use every day.

Experimentation
Experimentation is the process of learning by trying different things. With enough knowledge and work, a scientist or engineer can make predictions about what will happen under certain conditions. Sometimes it is easier to try each condition and see what happens directly. For example, a chemist may be able to analyze the composition of two different types of paint and figure out which one will dry first, but the easier way get the information would be to just try the paints next to each other, aim a fan at them, and touch them every once in a while.

Failure
Failure is a temporary situation and a learning tool we encounter when things do not work as expected. If we take a lesson from every failure and never quit, sooner or later things will work out. True failure only comes when we give up.

Friction
Friction makes it difficult to slide surfaces on each other. The harder the surfaces are pressed together, the more friction there is between them. Friction also depends on the materials in contact. For example, ice slides on glass easily and rubber slides on ice easily, but it is hard to get rubber to slide on glass. When surfaces slide despite friction, energy is lost in heat and the surfaces also begin to wear out. LEGO axles are designed to spin freely with little friction, as long as they are not bound or bent. When building your robot, make sure that every axle turns freely, otherwise the motors will be working to fight friction instead of producing torque or speed, and your battery energy will be wasted.

Gear Ratio
The gear ratio of a set of linked gears is the big gear's number of teeth divided by the small gear's number of teeth (diameters work too). If the driven gear is the smaller one, you are "gearing up," and if the driven gear is the bigger one, you are "gearing down." Example: 16-tooth drive, 64-tooth driven... the system is "geared down, 4:1" (four to one). In other words, if your robot is a vehicle and you gear it down, it will be strong like a tank with lots of torque at the wheels, but if you gear it up, it will be fast like a sports car with lots of speed at the wheels.

Ground Clearance
The height of the tallest object your robot can go over without touching it or jumping it is your robot's ground clearance. If parts of your robot extend forward beyond its front axle and you want the robot to climb from a level surface to an inclined surface, it is important for the overhanging parts to have plenty of ground clearance.

IR (Infrared)
Infrared is a type of electromagnetic wave. Electromagnetic waves can transmit signals across distances, as the remote control for your television does, without having to travel through cables. Radio is another type of electromagnetic wave. You will use an IR tower to download programs from your computer to your robot.

Iteration
A temporary failure that gets you measurably closer to a solution can be called iteration.

Lever
A lever turns sideways force into torque (see TORQUE). In the example of a wrench and a nut, you push sideways on one end of the wrench, and the other end twists the nut. In fact, the longer the lever you push on, the more torque you can get from the same sideways force. For example: hold a wooden 12-inch ruler level by pinching the first half inch. Now try the same thing with a wooden yardstick. The yardstick exerts nine times the torque on your fingers than the ruler does, because it is three times longer and three times as heavy.

Linkage
A linkage is a sequence of parts that transmits force from where it is produced to where it is needed.

Parameters
The parameters of a system are the things you can set to certain values to control the outcome.

Problem Solving Model
Whether the solution to your problem is a design, an object, a piece of information, or a process, the steps for finding a solution usually look the same:

- Focus on the desired results, and clarify the problem in terms of those results.
- Break up the problem into simpler parts if possible.
- Brainstorm for solution ideas for each part.
- Choose the two or three best solution ideas for each part and develop them in detail.
- Mix and match the solution ideas into the best overall solution.
- Test and improve the solution thoroughly.

Random
Random means by chance only and not controlled. The more variability there is in a process, the more randomness there will be in the outcome. For example, it is harder to predict the outcome from rolling a six-sided die than a two-sided coin.

Reverse Engineering
Sometimes called benchmarking, this is the process of taking something apart and analyzing it to understand how it works.

Robot
Robots are a special class of machines, distinguishable by their human-like abilities to manipulate objects or move about, and the fact that they can perform different functions depending on how they are programmed. A robot is the solution to many precise, strenuous, monotonous, and sometimes dangerous challenges.

Robust
A robust design or process is one that yields consistent results in spite of changing conditions. For example, if you practice in a room with a window, the lighting can be much different at 4:00 PM than it was at noon. In a robust design, the light sensor would be placed and shielded so that the robot would not notice the differences in light.

Scientist
Scientists study the world around them to learn how things happened and what is going to happen next. Their knowledge has accumulated over the centuries to formulate the sciences of physics, chemistry, geology, biology, astronomy, and so on.

Stability
A stable robot is shaped so that it does not fall over easily. Typically, flat, long, wide robots are stable. Tall, short, narrow robots are unstable. Be careful when designing with large wheels. They are a good way to boost

ground clearance, but as your robot gets taller, it loses stability. Maintain stability by increasing robot width and length as robot height increases.

Subassembly

A subassembly is a portion of your robot that has a specific purpose, but can be taken off or put back onto the robot very easily.

Stress

An object under stress experiences internal forces that could result in the object deforming or breaking.

Types of stress include:

Tension	as a result of	pulling
Compression	as a result of	pushing
Torsion	as a result of	twisting
Shear	as a result of	bending

Technician

Technicians study the products and systems developed by engineers and are uniquely qualified to run and maintain them.

Torque

Torque is twisting force. Get a broom and hold it level, as if it were the handle of a shopping cart. Your left hand should be near the sweeping part, and your right hand should be at the very far right end of the handle. Now let go with your left hand, and try to keep the broom level. It is pretty hard, right? You just experienced torque. The broom exerts a counter clockwise torque on your right hand, and your arm exerts a clockwise torque to balance it. Torque is often exerted on shafts (like your right arm) by levers (like the broom). In turn, shafts exert torque on levers.

Torque-Speed Trade-Off

The longer a lever is, the farther you have to push its end to make it go around. To turn a 6-inch wrench once around, your finger will push sideways about 38 inches. For a 12-inch wrench, you would have to push 75 inches. It is the same for gears: a 16-tooth gear will go around twice for every time a 32-tooth gear does when they are meshed. Here is what this means:

A small driven gear will spin faster than the gear driving it, but it will make less torque.

A large driven gear will turn slower than the gear driving it, but it will make more torque.

Transport

To transport an object is to carry it to a new location. The need to transport objects is a common FLL Challenge problem. If your robot is designed to transport something, make sure to run tests over a variety of speeds and direction changes, and with a variety of obstacles, to make sure the carried object does not interfere with other robot functions and that the robot maintains possession of the object.

Variability

Variability in a system makes it hard to repeat outcomes. If you were asked to drop a piece of notebook paper into a trash barrel on the ground while you stood on top of a roof, it would take a long time, and you may never see the paper land in the same place twice. But if you crumpled it into a tight ball first, you would reduce the variability of the dropping process, and would probably make the shot in just a few tries. Think of variability sources like playing field flaws, lighting, battery power, wear, dirt, etc., and design your robot and your strategy robustly, to minimize the effects of variability.

Wheelbase

The wheelbase is the distance between the extreme front and rear axles.