THANK YOU
All volunteers are like gold, but the referee’s role is extra-critical, and we thank you very much for stepping up. The referee needs the most preparation, needs constant focus for long hours, and can sometimes take some heat, but no one is better positioned to enjoy the children’s tournament experience than you.

THE GOAL
Our goal through the FLL tournament is for the children to have fun showcasing their unique ideas and hard work. We want the tournament to be a positive experience that celebrates and reinforces all they enjoyed and learned about technology and humanity, and we want them to go out and spread this program. You as FLL referee will help us achieve this goal mostly through expert application of the rules, but once in a while, by knowing that the “correct” thing to do isn’t always the RIGHT thing to do.

REFEREE RESPONSIBILITIES
You are responsible for one team at a time on your side/half of an 8-foot square table. Another referee will oversee a team on the other side. Here is what your role entails…

BEFORE THE TOURNAMENT (*as far in advance as possible)
---Learn the main documents: Field Setup, Missions, Rules, and Robot Game Updates
---Practice

DURING THE TOURNAMENT
---Inspect the Field
---Govern the Action
---Make Judgment Calls
---Record Performance

BEFORE THE TOURNAMENT

Learn the Main Documents
Knowing these documents in detail will enable you to apply their specifics the same way as teams do, the same way as other referees do, and the same way from match to match. Knowing them well will also allow you to operate with confidence, so you yourself can enjoy the children and your experience and come back year after year as an experienced pro.

Field Setup
You need to learn how the Field Mat and Mission Models are supposed to be arranged and prepared on the competition tables. Though you might not set fields up, you will need to be able to inspect and correct them. There are many details involved with the setup, but once you’ve done it a few times with direction, these details are easy to remember.

Missions
The Missions describe the specific results required for points, and they put some constraints on how those results can be achieved. They are carefully worded to allow multiple solution paths and to allow what is not specifically restricted. Example: A mission might read “Use a robotic arm to empty the trash can.” In this case, it would not matter if the robotic arm reached in and grabbed the trash, or if the arm turned the can over. Either way, the can was emptied through the use of the arm. What would NOT score is if the robot simply ran over the can and it emptied in the process. The Missions are short and few, and easiest to understand and remember if you study them while looking at a field.

Rules
The Rules contain general definitions, requirements, constraints, procedures, and consequences. They exist to minimize unfairness while maintaining the integrity of autonomous robotics. There are many more rules than missions, and they affect each other, so take extra time with them.
Robot Game “Updates”
The Robot Game Rulings page is a critical list of clarifications and official decisions that supplement and
sometimes override parts of the other main documents. This list grows as the season progresses. Study the
Updates last. Once you have mastered the other main documents, the Updates can be understood and
remembered easily. Download and read them during the week before your tournament, and check them one
last time on that Friday after 3PM.

Practice
No amount of reading can substitute for actual practice.

Learn by Doing
FLL refereeing is a skill, and as with all skills, there is no substitute for practice in the pursuit of competence,
much less excellence. For the best preparation possible, learn by doing. Try to arrange and referee a mini-
practice tournament before your first real one. If you can’t get children together for this, substitute adults.
Also…

Run Through Some Matches Mentally
Make every effort to go through the main documents with another referee or imaginative person while looking
at a field, and challenge each other on situational examples that you make up. Often the scenarios you invent
will not occur, but you are training yourself to make rule-based decisions fluently.

Take The Referee’s Quiz (Attached)
The Quiz has two functions. The primary one is to test your confidence about making decisions of the type
referees are faced with. The secondary function is to actually test your knowledge and application of relevant
specifics from the current season. There is no answer key for the Quiz other than the Challenge text. At a
tournament, the answers are what you say they are. Make that because you’re an expert, not just because
you’re a referee.

Ask Questions
To get official insight on anything, please contact Scott Evans sevans@usfirst.org --- and be sure to identify
yourself as a referee.

DURING THE TOURNAMENT

Inspect the Field
Your tournament will likely have a person designated to reset the field between matches, but if not, you will be
doing it. Either way, you’ll be inspecting the field setup, and the importance of perfection here can not be
overemphasized. Refer to the Field Setup instructions for exact placement of the field objects, and settle any
differences you may have with the field resetter before the first match begins. Also, make it very clear to the field
resetter that after each match, he or she is not to touch anything until you have recorded the team’s performance
and given the okay for a reset.

Govern the Action
During the match, you will watch the interaction between the team, the robot, and the field, to make sure that the
specifics of the Missions, Rules, and Updates are applied. Your three functions will be to:

Put the Children at Ease
For many of the children, the robot drivers in particular, going up to the table to stand and deliver after so
much work, with such high hopes and expectations, and the pressure of cameras and hundreds of sets of
eyes on them is extremely stressful. You can often see them shaking with nerves. Be sensitive to this,
especially in Round 1 of the day. If you notice it, see what you can do to calm and reassure those children
without throwing off their concentration. Wearing a silly hat helps. Joke a little. Kneel down to talk.

Allow or Not Allow Action
Example 1: If the team has three kids at the table, by the Rules, you’ll remind them one has to step away.
Example 2: If the kids start to work on their robot while it’s in Base, by the Rules, you’ll do nothing.
Example 3: If the kids try to shine a flashlight at the robot, by the Rules, you’ll ask them to put it away.
Determine Where Objects Are Kept After They Are Moved
Example 1: By the Rules, if a part falls off the robot (damage), the team can get it back immediately, but if the robot shoots something away (expendable), they can’t get it back until the end of the match.
Example 2: By the Rules, if the robot carries an object away from Base and gets stuck out in the field with it, the team gets that object back for another try, but if the robot instead loses control of that object, the object stays in the field.

When the day is done, teams will be happy if they can at least pull off the kind of score they’re used to in practice, and while there are many variables affecting the score, you must not be one of them. The vast majority of the time, you can avoid influencing the scores through correct and consistent application of the specifics in the main documents, but the truth is, FLL Challenges are brand new every year, so they don’t enjoy a long evolution---situations will develop which have never been dealt with before---and they will require judgment calls on your part.

Make Judgment Calls
For the most part, the team gets what the team earns, and you’re just an observer. But in close calls, and in unique situations for which there is no official ruling, your ruling on the spot will be seen as a factor in at least one team’s score. But don’t worry…

Take the Wording at Face Value
Just like the official rulings found in the Updates, your rulings must be based on the WORDING of the Missions, Rules, and Update posts. Please do not make rulings based on how a situation would be “in real life” or on what you feel was the “intent” of the wording. Because of the nature of robotics and competition, the various descriptions and measures of action and performance are written in plain language and in specific detail, so we need to respect the literal/exact wording of the materials as a contract whenever possible.
Example 1: If a mission requires the robot to simply “get onto” a set of stairs, note that there is no requirement for the robot to “climb” the steps, so a strategy where the robot topples onto the top of the stairs would score.
Example 2: If the robot were required to “carry” an object, “dragging” it would not score.

If a Detail Isn’t Mentioned, it Doesn’t Matter
In the absence of SOLID text against a particular strategy that may seem weird, unexpected, or too easy, please avoid the mindset that the strategy in question is “cheating,” or “lawyering”… Instead call it INNOVATION and move on. We are HAPPY to see the kids “beat” the constraints. Again, you either CAN or can NOT point to SOLID TEXT against what they did. If you can, then rule against them. If not, don’t.

Give Benefit of The Doubt
Thousands of hours went into the text, and you are expected to take many hours to learn it. But after all that, it is understood and accepted that the text will never map perfectly to actual play, and that you will never have perfect knowledge of the text. WE DO NOT WANT THE TEAMS TO PAY FOR THIS.

- When there’s pretty solid text pointing to something being illegal or non-scoring, rule against it. This call is easy!
- When there’s spongy text or no text pointing to something being illegal or non-scoring, let it go. This call is easy!
- If you’re really on the fence about something, get guidance from other referees and/or the head referee. Then this call is easy!
- Finally: If the team you’re dealing with is insistent that you’re wrong about something, and especially when multiple teams are insistent you’re wrong about something – a referee conference including a fresh, hard look at the relevant text is highly advised. After that, the call is easy!

This of course is not a license for you to not do everything you can to know the text. But it is a stress relieving cushion for all parties in the face of genuine uncertainty.

See the Big Picture
Your job is to be correct, exact, and consistent with details, but your GOAL is to help facilitate the children having a wonderful time on their big day. In truth, situations arise when it is more important to make the a “good” call than it is to make the “correct” call. Note the difference:

Example 1: The team on your side got the high score of the day in Round 1, and there’s a huge crowd watching them this time. Here in Round 2, they’re very close to completing the last mission, which would again give them the same high score, but the buzzer sounds right before the robot reaches its goal… You
shake your head “No,” with a smile and clap for them, with your clip-board under your arm, as they pack up and regroup to fine-tune for Round 3. Of course you would have liked to call in their favor, but they missed the points, plain and simple. Correct call.

Example 2: The team on your side averages 80 points in a tournament where the average score is 245. At the end of their last match of the day, they are very close to completing a mission they have never completed before, which would give them their personal best ---130--- but the buzzer sounds right before the robot reaches its goal… The whole team is looking at you… As you… Give them a thumbs up! They all jump up and down, hugging each other with happy tears as if they just won Olympic Gold!!! And their coaches and parents are SO proud!!! GOOD call.

Referee Conference
In any tough case, you are strongly advised to hold an immediate referee’s conference before deciding, or as soon as possible thereafter. Even the harshest decisions are much more tolerable when a team sees their fate was carefully considered by a group, as opposed to one independent and possibly “wrong” referee. When a team is disappointed in Rounds 1 or 2, remind them that they still have Round 3. This is the main reason we assess teams only on their BEST round’s score.

Record Performance
Unless clearly stated in Mission text, all scores are determined at the end of the match, by the condition of the field at that time only. After the match, you will compare the positions and conditions of objects on the field with the scoring requirements, and mark up a quick form called a Ref Sheet (contact your tournament for ref sheets in advance). Ref Sheets serve as hard copy scoring backup, so be sure to write the team and round numbers at the top. Some entries require a yes/no answer, some require you to count objects, and some require you to confirm that a particular method was used. You do NOT need to know or write the mission point values, or do any math. This part of your job should only take a minute or so after each match, but it must be done immediately after the match ends, and before anyone touches the table.

After the Ref Sheet is filled out, and you have gone over it with the team so they can see how their score came about, it is taken to the scorekeeper. Again, the scorekeeper/computer takes care of the score; you do not need to do any math.

*Poorly prepared referees are less helpful than missing referees. Your tournament organizer and/or head referee should help you prepare, but the ultimate responsibility is yours, so be sure to get materials and information as soon as possible. Thanks again!

HEAD REFEREE RESPONSIBILITIES
As with referees, the Head Referee’s role is critical, and then some! In addition to being a highly qualified referee, the Head Referee is also responsible for:
---recruiting, training, and overseeing all tournament referees.
---recruiting referees who work well with kids, and have a positive attitude.
---tracking and timing robot performance rounds and coordinating referees with the Emcee, Scorekeeper and the Field Manager.
---performing quality assurance on all tournament field setup kits at least one week prior to the event.
---performing quality assurance on all competition and practice fields the night before the event.
---ensuring that referee shirts, clipboards, score sheets, and pens/pencils are prepared for referees the morning of the tournament.
---providing input from referees and field staff to the Judge Advisor for final judging deliberations.
---making final decisions if robot performance action or scoring is in dispute.
REFEREE QUIZ
NATURE'S FURY

Remember, this quiz is as much about you making decisions as it is about you making good decisions. In each situation, decide your course of action among the options (more than one might be appropriate). Make your unbiased decisions, then discuss with other referees. If a serious argument develops, then feel free to get an official opinion (sevans@usfirst.org), but remember – it will still be an opinion – based on knowledge and interpretation of the very same Challenge text you have access to.

- Prevent the action from continuing
- Reverse the action as soon as possible
  ---Restore a condition   ---Repair a model
- Record the mission as scoring or non-scoring in real-time
- Do nothing
- Take an object off the field
- Keep an object off the field
- Move an object to Base
- Ask a team member to do or not do something
- Assess something as "IN"
- Assess something as "TOUCHING"
- Assess post-match score or no score

1 – There are 4 kids at the table and the emcee is asking you if your table’s ready.
2 – The kids press go. The robot extends an arm up 18 inches. The robot leaves Base.
3 – The robot drives into Base 14 inches tall. What do you do?
4 – The match ends with a load of supplies in a basket on the robot. They’re over the line, but not touching the mat. Scoreworthy?
5 – Before the match ended, the robot drove completely into RED from the northwest, but then drove out. The match ends. Scoreworthy?
6 – The emcee wants to start the match, but the kids at your table aren’t ready.
7 – At the one minute mark, the robot has crashed the plane’s launch tower and it has fallen onto the table.
8 – The robot launches the plane. It hits a bunch of debris and stops way short of YELLOW. The robot pushes the plane into LT BLUE. What do you do?
9 – The robot pushes two roof debris into LT BLUE. What do you do?
10 – While doing the gravity test to see if a loop is loaded legally, it takes some side-shaking for the loop to fall off. Pass?
11 – The robot grabs a roof debris out of LT BLUE. What do you do?
12 – The robot pushes 3 roof debris totally off the runway. What do you do?
13 – Robot has Duplo parts. Legal?
14 – There is 1 water in PINK, the man in YELLOW, and the lady partly in PINK and partly in YELLOW. Does the lady score, and if so, where?
15 – The game ends with 1 roof outside LT BLUE and 3 roof inside LT BLUE, how many roof penalties had been given?
16 – There are 2 people in RED with 1 water, and 1 pet, and 1 person in PINK with 1 pet and 1 water. How many points is this worth? Hint: Don’t spend more than 5 seconds on this.
17 – Team asks you to remove scattered tan bldg segments from runway, saying it was in a Q&A. You’ve never seen that.
18 – The people were all together in ORANGE for most of the match, but the robot scatters them out at 2:25.
19 – The robot grabs the power lines plus branch, brings them to Base, and returns the power lines. Scoreworthy?
20 – The team is complaining that the walls at your event are much lower than their practice walls and want benefit of the doubt. What do you do?
21 – Robot relies on heavy use of red string. When you ask about it, they say it’s a LEGO part. What do you do?
22 – Your team has a horrible match. Other team has an awesome match. Your drivers walk around and make a bowing “I’m not worthy!” gesture, followed by high-fives. What do you do?
23 – At 9AM, a team wants access to a competition table to do light calibration. Matches start at 10:15. Allow?
24 – Enormous mass leaves Base completely. Tiny mass with controller comes back to Base. Kids take the giant remainder off the table. What do you do?
25 – Kids hand-trigger a catapult to shoot what else, the cat, to RED. Their hands didn’t do the throwing - the device did. Scoreworthy?
26 – Team habitually starts a tiny, low-performing robot a half-inch out of Base. It doesn’t help them at all. What do you do?
27 – You recognize “converter wires” (an un-pictured electrical component) on the robot. It’s Match 1. What do you do?
28 - Team is arguing they should get DK GREEN obstacle points because their robot definitely broke the plane into that area - the proper definition of “in.” Scoreworthy?
29 - Robot totally in Base. Box of supplies ready to be pushed out, is partly outside Base. Can they start?
30 - Robot leaves Base goes awry, accidentally drops a box of supplies next to the pointer, and heads west. Kids stop the robot and grab the box of supplies. What do you do?
31 - Robot has left 3 strategic objects outside Base: One is much bigger than the robot, and two are about the same size as the robot. Penalties?
32 - Robot leaves Base and expands giant cross-field scissor arm. It doesn't retract. Kids grab robot. One penalty or two?
33 - Team from earlier match complains that they remember getting 2 penalties and you gave them 3. What do you do?
34 - Team from earlier complains that the standings show their Match 2 score as 25 when they're sure they scored over 200. What do you do?
35 - Team wants brick obstacle swivel ramp to be set west-end-down, because they saw it that way in a video. Allow?
36 - Robot uses wedge feature to substantially lift/deflect the plane's string, for driving clearance. Allow?
37 - By only hitting the string, the robot gets the plane to launch. Scoreworthy?
38 - The robot gets the truck to Base, but the contents spilled and scattered outside Base. Team wants those contents, since this is how it was handled in the past. Allow?
39 - A tan building segment goes over the north wall. What do you do?
40 - The robot uses tan building segments from the west tower in code building. Scoreworthy?
41 - The robot uses tan building segments from the west tower in code building. Base isolation mission would have scored. Does the Base isolation mission still score?
42 - The branch breaks. Action looked normal. All pieces are on the mat. Lines and tree still standing. Scoreworthy?
43 - Ambulance has clearly reached yellow, but it's on its side. Scoreworthy?
44 - Truck has clearly reached yellow, but it's on its side. Scoreworthy?
45 - Tsunami waves cause evacuation sign to fall. Kits want you to restore it. What do you do?
46 - Robot uses lever to raise house, but keeps going. Cleans house right off foundation. What do you do?
47 - Robot uses forklift thru windows to raise house. Drives away. 20 seconds later, it smashes the house off its foundation. Scoreworthy?
48 - RED contains Lady's loop portion and the complete child model. Orange contains lady portion and the complete man model. Does the lady count, and if so, where?
49 - Team is shocked to find all your mats centered on the tables. They desperately need the mat pushed west when they compete. What do you do?
50 – Tsunami is triggered score-worthy. Team wants you to remove the waves now, which are in the way of their code work. Remove?
51 - The evacuation sign was raised using a strategic object, but then that object was pulled away. Scoreworthy?
52 - Robot triggers a tethered mini-me to leave Base and bring supplies to red. Team touches robot while mini-me is in red, and starts to “reel in” the mini-me.
53 - Robot triggers an independent (untethered) mini-me to leave Base and bring supplies to red. Team waits for controller-robot to reach Base, then touches it. Are they penalized for the mini-me being outside Base?
54 - Is a mini-me a strategic object?
55 - Evacuation sign is hyper-pushed and jammed/locked in the up position. Scoreworthy?
56 – The robot has many supplies in a bin at its rear. When the match ends, only the (empty) front of the robot has reached RED. Do the supplies count?
57 – The robot expands from Base with a scissor arm to smash the gray bldg out of LT GREEN. Then the arm retracts, but the kids still need to rescue the robot. One penalty, or two?
58 - Robot builds a 10-story code bldg. You accidentally knock it over with your clip board. What do you do?
59 - Robot builds a 10-story code bldg. Team accidentally knocks it over by bumping the table. What do you do?
60 - With no debris anywhere, the robot triggers the plane and it barely gets to YELLOW. What do you do?
61 - The pointer is well past X, but obviously not at Y yet. Is it worth X or Y?
62 - You can't tell for sure which color the pointer has reached. How do you score it?
63 - Robot consistently uses a technique which breaks the people, pets, and supplies off their loops. It's Match 1.
64 – Late in the match the robot crashes into the pointer, setting it way forward, but you're not sure how much. What do you do?
65 – The team’s equipment includes 5 gray building segments. What do you do?
66 – The robot’s first interaction with the house is to smash it off its foundation by accident. Later on, the robot goes out of control and happens to hit the lever and raise the house - Scoreworthy?
67 - The kids ask you to move the roof debris from its storage place in the southeast so they'll have room for entering RED. What do you do?
68 – In the middle of a match, you suddenly REALLY need to go to the bathroom. What do you do?
69 - The dirt bike is in RED, the helmet is not. Is the bike scoreworthy?
70 – The robot parks a rubber-band device next to the pointer model, activates it, and leaves the area. Allowable?
71 – The robot moves the pointer on purpose. Allowable?
72 - From the northwest, the robot flings the cat to RED. Scoreworthy?
73 – The robot knocks the tsunami waves off the ramp southward instead of pressing the lever. What do you do?
74 – The robot misses lancing water loop and blame the fact that the loop is deformed. It is. They want the points.
75 – Before the match, the kids ask you to check that the northwest tree is planted solidly. What do you do?
76 – Before the match, the kids ask you to give a couple of clicks to the plane’s string. It would go from level to slightly over level. What do you do?
77 - The robot rolls on the black patch south of the river, but otherwise goes well over obstacles. Scoreworthy?
78 - The robot enters the obstacle sequence midway, then goes to red. Scoreworthy?
79 - The robot clamps along the wall and uses it like a rail to avoid and pass all the obstacles. Legal? Scoreworthy?
80 – The boom box has fallen over the south wall. What do you do?
81 – The other team’s robot is the only one that moved the pointer. Do your kids get credit too?
82 – The branch is on the mat, the tree and power lines are standing, but the power lines model is not perfectly on its mark. It’s close. Scoreworthy?
83 – The other team’s robot reaches over and knocks your tree down. It was clearly designed to do this. What do you do?
84 – A tan bldg segment comes over your north wall and knocks over the flashlight model. What do you do?
85 – The robot is identical to one run in the previous match. What do you do?
86 – The robot’s arm extends past the back of Base a little, but the robot is otherwise fitting totally in Base to start. Okay to start?
87 – The plane is score-worthy in yellow, but a wing has fallen off and sits on the runway. How does the plane score?
88 – The robot’s controller is black. Legal?
89 – “Zombie Squad” is written on the robot’s white controller. You’re a big fan of zombies. Legal?
90 – The team is using a paper template to position the robot. Legal?
91 – The robot, on the table, has 3 motors. A child holds an alternate chassis which has 2 motors. The chassis are switched out such that there are never more than 3 motors on the table at a time. What do you do?
92 – There are 2 light sensors present in each of three separate attachments, for a total of 6. What do you do?
93 – A coach comes to you in confidence and tells you of a team that has a “HiTechnic” color sensor on their robot. What do you do?
94 – In conversation with the kids, you learn they have programmed using “NQC.” What do you do?
95 – Before the match, the team complains that there’s a gap between the mat and the west border wall. What do you do?
96 – The robot’s wires extend past the back of Base a little, but the robot is otherwise pasting totally in Base to start. Okay to start?
97 – The robot’s arm extends past the back of Base a little, but the robot is otherwise pasting totally in Base to start. Okay to start?
98 – The robot’s arm, well off the mat, looks like it might be extending past the front of Base to start, but you’re not sure. Okay to start?
99 – The kids stick the lady loosely to the robot and then start the robot before you grasp the situation. What do you do?
100 - The robot captures and clamps onto the dog and cat so they’ll obviously fail the gravity test. What do you do?
101 - The kids place the grain and gray bldg segments outside Base by hand. Then they send the lady to ORANGE. What do you do?
102 - The kids align the robot in Base with a frame, and then start the robot without pulling the frame away first. What do you do?
103 – The kids align the robot in Base with a frame, and then start the robot without letting go of the frame first. What do you do?
104 – The kids touch the robot as it’s entering Base, but the loop it’s carrying clearly hadn’t reached yet. It’s obvious the loop would have reached if they had waited. Do they keep the loop?
105 – The kids try to load the lady onto the robot by hand. The match will end soon. A very slow robot gets the evac sign to rise, then they grab the robot. Sign stays up under its own appropriate friction. Scoreworthy?
117 – The match will end soon. The robot drives to RED and then strains against the wall. The kids shut it off. Penalty?
118 – A wheel falls off the robot but is now totally outside Base. The kids want you to hand it to them. What do you do?
119 – The robot is exiting Base. A child notices it’s aimed wrong and gives it a tiny tap before it gets completely out. What do you do?
120 – Your field resetter has reset the pointer model before anyone got to see that score was on it. What do you do?
121 - The coach of your current team is upset that her kids lost points because the mat was too “wavy.” She wants a do-over. There’s no time in the schedule. She’s super-nice. What do you do?
122 – The coach of your current team is upset that her kids lost points because the mat was too “wavy.” She wants a do-over. Matches are running early. She’s a bit of a jerk. What do you do?
123 – The tables at your event have a square of Dual Lock under each corner to keep the mat in place. Two teams are complaining about it. Your Head Referee says he knows for sure that the mats are allowed to be “taped” down. What do you do?
124 – Before matches start, a team mentions a confusing strategy they have and contend that you must allow it because “Scott Evans from headquarters said it’s legal.” They have a copy of the e-mail. Does your answer change if this happened during Match 1?
125 – A coach is complaining that the table walls are the wrong height and wants you to show him the spec. Where is it?