

REFEREE GUIDE + QUIZ

FLL 2012/13 SENIOR SOLUTIONS

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 SENIOR SOLUTIONS

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 20 inches. The robot leaves Base.
- 3 – The match ends with a loop over the Base area, but not touching the mat yet.
- 4 – The robot was in scoring position on the center platform 55 seconds into the match and the kids removed it.
- 5 – The emcee wants to start the match, but the kids at your table aren’t ready.
- 6 – The robot has cleaned the table right off its Dual Lock and is pushing it east.
- 7 – The kids forgot to fix the chair before sending into scoring position, where it is now.
- 8 – The chair was in Base for most of the match, but the robot pushed it out near the end, to the middle of nowhere.
- 9 – The robot grabs the dog from its set-up position and gets it to Base.
- 10 – The robot smashes the gray wheel but the dog doesn’t budge. After the match the kids say this mission always works at home and they blame this table’s model, and want the points.
- 11 – The skateboard, on its side, has its two tires reaching Base, but the rest of the board, and the dog, are not.
- 12 – The robot drops a ball onto the bowling pins. The ball was clearly not rolled.
- 13 – The robot was only about 2 inches from the pins when it shot a ball and knocked some over.
- 14 – The robot shoots a ball at the pins all the way from Base.
- 15 – The kids shoot a catapulted ball at the pins from completely in Base.
- 16 – A red ball from the other team has rolled into Base. Your table’s kids load it onto the robot for a successful pin shot.
- 17 – The robot drops a low-profile frame around the pins, backs away, then shoots a ball and pins fall.
- 18 – The robot pushes the pins into the northeast corner, backs away, then shoots a ball and pins fall.
- 19 – The robot gets 4 pins to Base and the kids knock them over by hand, claiming they’re allowed to touch stuff in Base.
- 20 – The robot shoots a ball at the pins. 4 fall. One standing one is broken. One fallen one is broken.
- 21 – Yellow bowling ball #1 flies off the table.
- 22 – Bowling ball from other team knock over an orange medicine on your table before the mission is attempted.
- 23 – The robot shoots yellow ball knocking a few pins over, then crashes pile and knocks the rest over. You’re not sure how many the ball knocked over.
- 24 – The team is loading identical bowling pins from home to shot at the table’s pins.
- 25 – The team is loading bowling pins of their own design to shoot at the table’s pins.
- 26 – The robot lifts the weight machine’s wheel directly while also lifting up on the gray bar.
- 27 – The robot flips the stove top over with such force that it bounces back to showing red.
- 28 – The stove top is flipped over, but has about 15% left to go and is just sitting there like that.
- 29 – The robot flipped the stove top over beautifully to show all black and then immediately crashed and ripped the stove off the mat. The stove, on its side, now shows red. What if it now showed black?
- 30 – The robot flipped the stove top over beautifully to show all black and later in the match crashed and ripped the stove off the mat. The stove, on its side, now shows red. What if it now showed black?
- 31 – The robot, having done nothing with the stove, crashes into it and rips it off the mat. On its side, it now shows red. The stove, not the robot.
- 32 – The kids reposition the plants on the garden base before loading it onto the robot.
- 33 – Only the plant from the garden model is touching the scoring zone.

- 34 – The garden model is clearly over the scoring zone, though not actually touching the mat.
- 35 – The kids ask you to rotate the red flag slightly providing a tiny bit of space under it.
- 36 – In the middle of a match, you suddenly REALLY need to go to the bathroom.
- 37 – The robot raises the flag but later bumps into it and it goes down. They say it was an accident and want that undone.
- 38 – The robot lifts the flag, but pulls the flag off its pole. The pole is still up.
- 39 – The robot delivers two orange quilts to their south scoring zone, but the quilts are stood on end.
- 40 – The kids stick the quilts together with an L-bracket pressed on, in preparation for delivery.
- 41 – The robot parks a rubber-band device next to the pinwheel. Then the robot enters and exits Base completely, bumping into the device, which turns the wheel 90 degrees at a time. Since the device is large, this seems to save the robot a lot of driving time.
- 42 – The robot exits and enters Base rapidly 8 times, then parks at the pinwheel and turns it 720 degrees.
- 43 – The robot moves the cardio machine's pointer directly. It looks like this was done on purpose.
- 44 – The robot moves the cardio machine's pointer directly. It looks like this was accidental.
- 45 – You discover after the robot has done the cardio mission properly several times, that no one reset the cardio dial after the last match. You don't know how many times the current team should get credit for.
- 46 – The robot flings the top loop to Base where it is caught by a child.
- 47 – The robot bumps the white shelf model and the top loop falls onto the robot. The loop is brought to Base.
- 48 – The kids bump the table and the top loop falls. The robot is not in the area.
- 49 – The robot misses lancing the top loop and blame the fact that the loop is deformed. It is. They want the points.
- 50 – Before the match, the kids ask you to unwarpage the top loop.
- 51 – Before the match, the kids ask you to make the top loop as flat as possible.
- 52 – The upper part of a yellow loop has made it to Base, but the bottom is still outside Base.
- 53 – The robot is on the center platform, not touching anything else, but an arm is extending out over the stairs.
- 54 – The robot is on the center platform, not touching anything else, and the platform is balanced, except it has crept west a little and is touching the stairs.
- 55 – The robot is moving the center platform to Base so they can arrange the robot to balance on it there, by hand.
- 56 – The robot tips the center platform north, drives on, inches forward, and meets full balance scoring conditions.
- 57 – Before the match, the kids on your team wander over to the other team's drivers and start talking about the missions.
- 58 – During the match, the kids on your team wander over to the other team's drivers and start talking about the missions.
- 59 – The robot reaches over the north border wall and moves the other team's similarity model.
- 60 – The robot takes all medicine bottles back to Base, the kids grab the green one, then the robot returns the orange ones. Remarkably, these oranges are extremely well-lined up inside their marks.
- 61 – Before the match, a child is using a wooden ruler to measure the distance to the green bottle.
- 62 – Before the match, a child is using a ruler made of LEGO to measure the distance to the green bottle.
- 63 – Before the match, a child is using a ruler made of LEGO off the south side of the table to assess the green bottle.
- 64 – During the match, a child is using a ruler made of LEGO off the south side of the table to assess the green bottle.
- 65 – The robot's attachment directly knocks a ball of your table's colors onto your table. It knocks a pin down.
- 66 – The robot's attachment directly knocks a ball of the other color onto your table. It knocks a pin down.
- 67 – The other team properly sends a ball of their color onto your field. It shifts a pin but doesn't knock it down. Your table's team wants the pin put back in place, citing interference.
- 68 – The robot gets its ball color down to the center properly, then parks a device in place to prevent any further action.
- 69 – Midway through the match, the other team's robot goes mad and smashes the ball model. Balls all over.
- 70 – The robot's controller is black.
- 71 – "Zombie Squad" is written on the robot's white controller.
- 72 – The team is using a paper template to position the robot.
- 73 – 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.
- 74 – There are 2 light sensors present in each of three separate attachments, for a total of 6.
- 75 – A coach comes to you in confidence and tells you of a team that has a "HiTechnic" color sensor on their robot.
- 76 – In conversation with the kids, you learn they have programmed using "NQC."
- 77 – Before the match, the team complains that there's a gap between the mat and the west border wall.
- 78 – The robot's wires extend past the back of Base a little, but the robot is otherwise fitting totally in Base to start.
- 79 – The robot's arm extends past the back of Base a little, but the robot is otherwise fitting totally in Base to start.
- 80 – 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.
- 81 – You think there's a remote chance the quilts, ready for delivery, would fail the gravity test.
- 82 – The kids place the quilts and garden outside Base by hand. Then they send the robot to the pinwheel.
- 83 – Two kids are at the table, but another child away from the table is holding robot parts.
- 84 – The kids align the robot in Base with a frame, and then start the robot without pulling the frame away first.
- 85 – The kids align the robot in Base with a frame, and then start the robot without letting go of the frame first.
- 86 – The kids start the robot by bumping a sensor.

- 87 – The emcee starts each match with “3, 2, 1, Robot!” This child just started during the word “robot,” but obviously before it was finished. You realize this before anything happens.
- 88 – The emcee starts each match with “3, 2, 1, Robot!” This child just started during the word “robot,” but obviously before it was finished. You realize this only after the pinwheel has been moved 90 degrees.
- 89 – The robot gets stuck at the stove while carrying the garden.
- 90 – The robot gets stuck at the garden scoring area while letting go of the garden.
- 91 – The robot gets stuck at the ramp while carrying a loop.
- 92 – The robot gets stuck at the ball model while pushing the chair.
- 93 – The robot gets stuck at the ball model while carrying the chair.
- 94 – The robot bumps the pinwheel backward once by obvious accident.
- 95 – The robot turns the pinwheel 180 degrees at once. You can't tell if this was an accident.
- 96 – The robot smashes the dog ejector and it breaks apart into pieces. The dog gets rolls to Base. What if it didn't?
- 97 – The robot opens up like a long accordion, grabs the top loop, and backs up a tiny bit, reaching Base. The kids grab.
- 98 – 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. What if it wasn't?
- 99 – The robot hits the dog ejector, the dog rolls to Base, then the robot fwap-extends a long axle to Base. The kids grab.
- 100 – The robot entering Base probably doesn't fit under the height limit of Base, but you're not sure.
- 101 – The kids try to load the garden onto the robot by hand.
- 102 – The match will end soon. The robot drives onto the center platform and the kids shut it off while it's still moving.
- 103 – The match will end soon. The robot drives onto the center platform and stops. The kids shut it off.
- 104 – A wheel falls off the robot but is now totally outside Base. The kids want you to hand it to them.
- 105 – The robot is exiting Base. A child notices it's aimed wrong and gives it a tiny tap before it gets completely out.
- 106 – Your field resetter has reset the weight machine before anyone got to see that score was on it.
- 107 – A parent comes to you in Round 3 and says they think their Round 1 score is inaccurate.
- 108 – 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.
- 109 – 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.
- 110 – 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.
- 111 – 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. What if it was during Match 1?
- 112 – A coach is complaining that the table walls are the wrong height and wants you to show him the spec.
- 113 – The robot has a yellow/identical bowling ball as part of its chassis, being used as a caster.
- 114 – The team tries to deliver the chair to the scoring area and misses. They ask you to move the chair off the field.