

FIRST LEGO League Robotics

- What is FIRST LEGO League Robotics?
 - FIRST® LEGO® League introduces science, technology, engineering, and math (STEM) to children ages 4-16* through fun, exciting hands-on learning.
 - Participants gain real-world problem solving experience through a guided, global robotics program, helping today's students and teachers build a better future together.
 - All FIRST LEGO League Challenge teams, coaches, mentors and organizers know the FIRST Core Values and act according to them. They describe our way of working together, which is characterized by respectful cooperation.
 - Discovery: We explore new skills and ideas.
 - Innovation: We use creativity and persistence to solve problems.
 - Impact: We apply what we learn to improve our world.
 - Inclusion: We respect each other and embrace our differences.
 - Teamwork: We are stronger when we work together.
 - Fun: We enjoy and celebrate what we do!
 - Outline of the Program:
 - The teams are judged in the categories
 - Robot Game: 3 Robot Game preliminary rounds in order to solve as many missions as possible and collect points. Each match lasts 2½ minutes. Referees evaluate the Robot Game and make sure that the rules are followed.
 - Research: During the preparation period, each team researches a problem of its own choice within the annual theme. Like real scientists, the teams develop a research question, research and consult experts to find a solution to the problem and share it with others. On the day of the tournament, the teams present their results to a jury in 5 minutes. It is important that all aspects of the research assignment are included. The presentation possibilities are manifold - the teams can be creative!
 - Robot Design: On the day of the tournament, the teams present the robot design to a jury in 5 minutes
 - Core Values: Team building activity to show how well the Core Values are shown within the team
 - Overall Performance
- Team:
 - 10 members of 3-5th graders
 - Meet Tuesdays and Thursdays from 3-5 in Mrs. Broach's classroom
- Pricing:
 - Team Registration: \$275 per year to compete
 - Challenge Set: \$75 per year
 - 1 time fee for a Practice Table to be built: See attachment (Note: Unsure on price of lumber)
 - 1 time purchase: LEGO Education SPIKE Prime Set \$339.95
<https://education.lego.com/en-us/products/lego-education-spike-prime-set/45678#spike%E2%84%A2-prime>
- Goal for 2021-2022 School Year
 - Purchase Challenge Set/Practice Table/Spike Prime Set
 - Create a team of 10-3-5th graders
 - Build a robot
 - Familiarize coding with the current challenge
- Goal for 2022-2023 School Year

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The **FIRST** Tech Challenge in North America and Mexico is a year-long program, starting with registration in May and ending with the **FIRST** Tech Challenge World Championships in April. The competition season varies from region to region, but can start as early as October and run as long as April for teams that advance. The following chart details the different aspects of the season and when they happen:

[illegible]

FIRST LEGO League Table

The field is where the Robot Game takes place.

- It consists of a field mat, on a **table**, with mission models arranged on top.
- The field mat and the LEGO® pieces for building the mission models are part of your Field Setup Kit.
- The instructions for building the mission models are at <http://www.firstlegoleague.org/missionmodelbuildinstructions>
- **The instructions for how to build the table are below.**
- The instructions for how to arrange and set up everything on the table are at <http://www.firstlegoleague.org/currentchallenge>

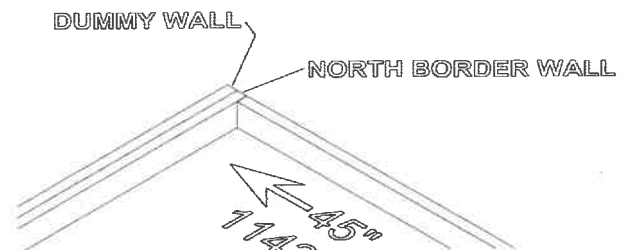
TABLE CONSTRUCTION

The Robot Game takes place on a specially designed table, so you'll need to build one to practice on if you don't already have access to one. With safety, weight, height, and cost in mind, a simple design is offered here, but as long as your surface is smooth, and your border walls are sized and located properly, how you build the understructure is up to you. The construction is simple, but does require some wood-working skills.

At a tournament, two tables are placed back to back, but you only operate on one table, so you only need to build one table to practice on. We'll call your practice table a "half-table."

Most challenges have a "shared" mission model, which rests partly on your table, and partly on the other team's table. So in addition to building your table, you'll need to build a tiny portion of a second table, so both halves of the shared model are supported. We'll call this added section the "dummy section."

Here are the instructions for building one "half-table," plus a dummy section:



Materials

Material	Quantity
Field Setup Kit (mission model LEGO elements, mat, CD, Dual Lock™)	1
sanded plywood (or other very smooth board) 96" X 48" X at least 3/8" (2438mm X 1219mm X 10mm)	1
two-by-three, 8' (2438mm) [actual cross-section = 1-1/2" X 2-1/2" (38mm X 64mm)]	6
flat black paint	1 pt. (1/2 L)
coarse drywall screws, 2-1/2" (64mm)	1/2 lb. (1/4 kg)
saw horses, about 24" (610mm) high and 36" (914mm) wide	2

Parts

Part	Make From	Dimensions	Paint	Quantity
table surface (A)	plywood	96" X 48" (2438mm X 1219mm)	no	1
long border wall (B)	two-by-three	96" (2438mm)	yes	3
short border wall (C)	two-by-three	45" (1143mm)	yes	2
stiffener (D)	two-by-three	48" (1219mm)	no	4
saw horse	purchase	H ≈ 24" W ≈ 36" (610mm) (914mm)	no	2

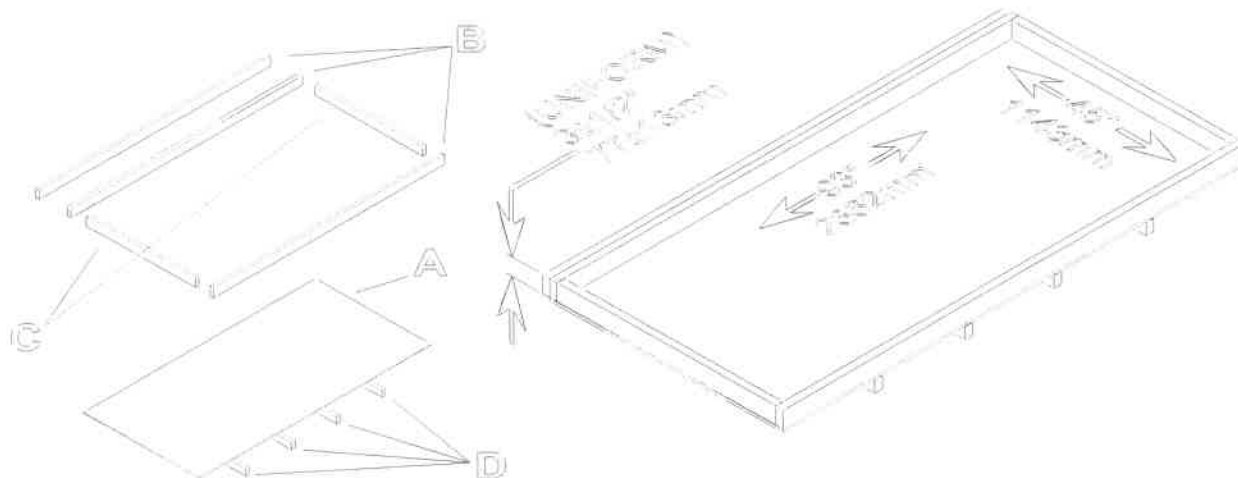
Assembly

Step 1 - Determine which face of the plywood (A) is least smooth, and consider that the bottom face. On the bottom face, locate, clamp, and screw on the stiffeners (D) (about every 18" or 457mm). Be sure screw head tops are flush. Sand any splinters.

Step 2 - On the top face of the plywood, locate, clamp, and screw on the border walls (B,C) around the top perimeter.

- The wall-to-wall dimensions must measure $93\pm 1/8"$ by $45\pm 1/8"$ ($2362\pm 3\text{mm}$ by $1143\pm 3\text{mm}$).
- The height of B and C must measure $3\pm 1/2"$ ($77\pm 13\text{mm}$). Note the use of the "plus or minus symbol." This means the maximum allowable height is three and a half inches (ninety millimeters) and the minimum height is two and a half inches (sixty-four millimeters).
- All border walls must be the same height as each other on any and all tables at a tournament.
- Border heights at a tournament may be different than those on your practice table.

Step 3 - With the help of another person, place this table top on short saw horses (or milk crates, or anything else short and solid).



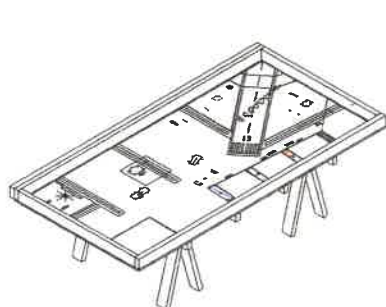
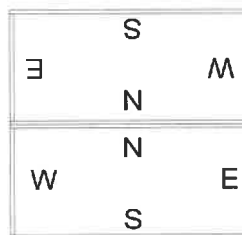
FIELD MAT PLACEMENT

Step 1 - Vacuum the table top. Even the tiniest particle under the mat can give the robot trouble. After vacuuming, run your hand over the surface and sand or file down any protruding imperfections you find. Then vacuum again.

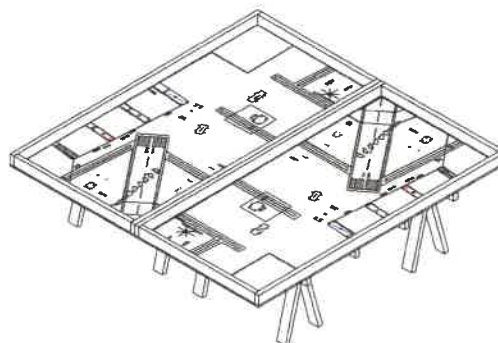
Step 2 - On the vacuumed surface (never unroll the mat in an area where it could pick up particles), unroll the mat so the image is up and its north edge is near the north/double border wall (note the location of the double wall in each table sketch below).

Step 3 - The mat is smaller than the playing surface by design. Slide and align it so that there is no gap between the south edge of the mat and the south border wall. Center the mat in the east-west direction (look for equal gaps at left and right).

Step 4 - With help from others, pull the mat at opposite ends and massage out any waviness away from the center and re-check the requirement of Step 3. It is expected that some waviness will persist, but that should relax over time. Some teams use a hair dryer to speed the relaxation of the waviness.



PRACTICE ("HALF TABLE")



TOURNAMENT ("FULL TABLE")

Step 5 - For a competition setup, the north edge of the two mats must be separated by $3-1/2 \pm 1/4$ " (90 ± 6 mm). Note the use of the "plus or minus symbol." After rounding, this means the maximum allowable separation is three and three quarter inches (ninety-five millimeters) and the minimum separation is three and a quarter inches (eighty three millimeters).