

# FIRST® LEGO® LEAGUE CHALLENGE

## CITY SHAPER



During the CITY SHAPER<sup>SM</sup> season, FIRST® LEGO® League teams explored the issues cities and towns face, like transportation, accessibility, and natural disasters, all while operating under the FIRST® Core Values, emphasizing teamwork and good sportsmanship.

### In the Innovation Project, teams will:

- Identify a problem with a building or public space in the community.
- Design a solution.
- Share their solution with others and then refine it. At official events, teams will present their Project, including the problem, their solution, and how they shared it, in a 5-minute presentation.

FIRST LEGO League teams researched and solved real-world problems just like scientists and engineers. Project judging takes place at all official FIRST LEGO League tournaments. Check your local event schedule for any opportunities to view team presentations. Teams may also share their solutions in the Pit area.

### In the Robot Game, teams will:

- Identify Missions to solve.
- Design, build and program a LEGO robot to complete the Missions.
- Test and refine their program and design.

The team's robot will have to navigate, capture, transport, activate, or deliver objects. The teams and their robot will only have 2½ minutes to complete as many Missions as possible.



## MISSIONS

### M01 ELEVATED PLACES (Score all that apply)

Bring the robot onto the bridge and completely off the mat. Score extra points if the robot can raise one or more flags.

### M02 CRANE (Score all that apply)

Lower the blue housing unit from its starting point on the crane. Lower the blue unit onto another blue unit. Lower the blue unit onto another blue unit in the blue target circle.

### M03 INSPECTION DRONE

Send an inspection drone to inspect the bridge for damage.

### M04 DESIGN FOR WILDLIFE

Hang the bat on the tree to show you won't disturb existing animal habitats.

### M05 TREEHOUSE (Score all that apply)

Build a house in harmony with nature in the small or large tree branches. --- in the large tree branches.

### M06 TRAFFIC JAM

Reduce traffic congestion by adding a bicycle path. Move the mission model to reveal the alternative modes of transportation.

### M07 SWING

Release the accessible swing so children of all abilities can be included in play.

### M08 ELEVATOR (Score one or the other)

The elevator is stuck on the top floor. Bring the blue car down to the mat. Take the elevator out of service by balancing it horizontally.

### M09 SAFETY FACTOR

Structural beams can keep buildings upright in a disaster. Knock out as many beams as you can without collapsing the building.

### M10 STEEL CONSTRUCTION

Raise the building's framework so it can stand straight up unassisted.

### M11 INNOVATIVE ARCHITECTURE (Score one or the other)

Deliver the model of your prototype you built with your Innovation Elements to any target for approval.

### M12 DESIGN & BUILD - PLACEMENT

Deliver building units to their targets. Score extra points by matching the unit color to the target circle. Stack building units on top of each other within a target circle for more points.

### M13 BUILDING UPGRADES

Score points by adding a garden, solar panels, or insulation to the top of a building unit to add beauty, sustainable power or efficiency to a structure.

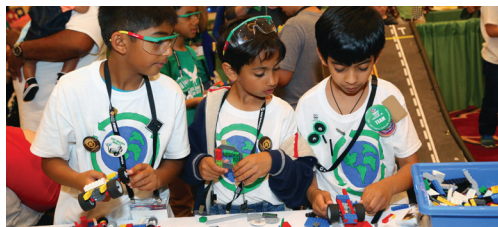
### M14 PRECISION

Every Precision Token left on the Field at the end of the Match, earns points.

# WELCOME SPECTATORS!

*FIRST*® is a robotics community that prepares young people for the future. The world's leading youth-serving nonprofit advancing STEM education outcomes, *FIRST* designed mentor-guided research and robotics programs for kids from pre-kindergarten through high school. Boosted by a global support system of mentors, coaches, volunteers, alumni, and sponsors, teams conduct research, fundraise, design, and build robots of their creation. For 30 years, students from all walks of life have developed self-confidence in STEM, meaningful friendships, and valuable, real-world skills through *FIRST* that open pathways and help young people build a better future.

## AGES 6-10 **FIRST LEGO LEAGUE JR.**



*FIRST*® LEGO® League Jr. teams build and program a model that moves using LEGO® Education WeDo 2.0 and present their research journey on a *Show Me* poster.

### Students will:

- Learn about a real-world theme
- Explore challenges facing today's scientists
- Discover real-world math and science
- Begin developing teamwork skills
- Practice presentation skills
- Celebrate at noncompetitive events
- Engage in team activities guided by *FIRST*® Core Values

## AGES 9-16\* **FIRST LEGO LEAGUE**



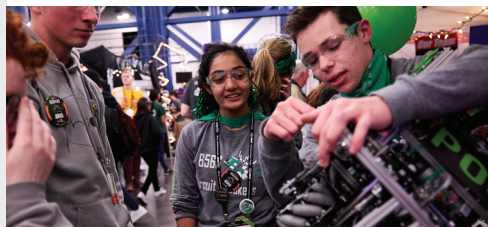
*FIRST*® LEGO® League teams build robots using LEGO® MINDSTORMS® technology and develop an Innovation Project based on a real-world Challenge that changes annually.

### Students will:

- Create innovative solutions to challenges facing today's scientists
- Strategize, design, build, program, and test an autonomous robot
- Apply real-world math and science concepts
- Develop career and life skills, including critical thinking, time management, collaboration, confidence, and communication
- Participate in official tournaments and local events
- Engage in team activities guided by *FIRST* Core Values

\*Ages vary by country

## AGES 12-18 **FIRST TECH CHALLENGE**

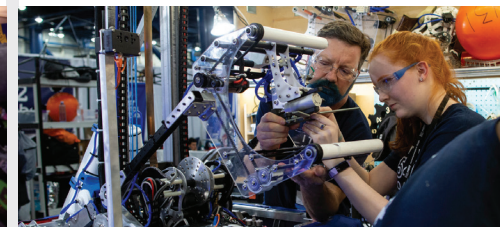


*FIRST*® Tech Challenge students learn to think like engineers. Teams build robots from a reusable kit of parts, develop strategies, document their progress, and compete head to head.

### Students will:

- Design, build, and program robots
- Model a real-world engineering process
- Apply math and science concepts
- Develop strategic problem-solving, organizational, and team-building skills
- Build life skills while building robots and work towards participating in tournaments and *FIRST* Championship
- Compete and cooperate in Alliances at tournaments
- Access exclusive scholarships from hundreds of colleges/universities

## AGES 14-18 **FIRST ROBOTICS COMPETITION**



*FIRST*® Robotics Competition teams compete with 120-pound robots of their own design, combining the excitement of sport with the rigors of science and technology.

### Students will:

- Work alongside professional engineers
- Build and compete with a robot of their own design
- Learn and use sophisticated hardware and software
- Develop design, project management, programming, teamwork, strategic thinking, and *Coopertition*® skills
- Earn a place in the *FIRST* Championship
- Access exclusive scholarships from hundreds of colleges/universities



At the heart of *FIRST* are its Core Values, which emphasize the contributions of others, friendly sportsmanship, teamwork, learning, and community involvement. These include: *Gracious Professionalism*® – Respect for others, being a good sport, and sharing what you learn. *Coopertition*® – Competing hard, but also helping the other teams.