

Welcome SPECTATORS!

FIRST® Progression of Programs FIRST® is the world's leading child-serving nonprofit advancing science, technology, engineering, and math (STEM). For 30 years, FIRST has evolved into a global movement by engaging millions of people with a proven game-changer for preparing kids to solve the world's greatest problems. FIRST programs inspire innovation and leadership through engaging, hands-on robotics challenges developed to ignite curiosity and passion in students in grades K-12. FIRST builds powerful mentorship relationships between young people and STEM professionals, helping kids gain confidence to explore the innovation process while they learn valuable science, engineering, technology, teamwork, and problem-solving skills. FIRST creates the people who will change the world – today and tomorrow.



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.

Children, Ages 6-10 (Grades K-4), get to:

- 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



FIRST LEGO LEAGUE

FIRST® LEGO® League teams build robots using LEGO® MINDSTORMS® technology and develop research projects based on a real-world Challenge that changes annually.

Students, Ages 9-16* (Grades 4-8), get to:

- 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



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, Ages 12-18 (Grades 7-12), get to:

- 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



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, Ages 14-18 (Grades 9-12), get to:

- 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.*

FIRST® LEGO® League Challenge

During the **INTO ORBIT**SM season, **FIRST**® LEGO® League teams explored problems associated with long-duration space travel, all while operating under the **FIRST**® Core Values, emphasizing teamwork and good sportsmanship.

THE PROJECT

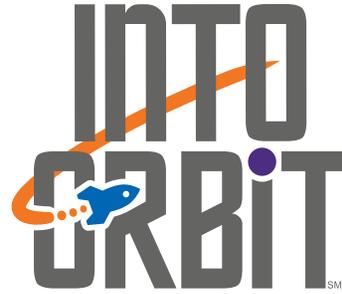
FIRST LEGO League teams researched and solved real-world problems just like scientists and engineers. Each team was asked to:

- **Identify** a physical or social problem faced by humans during long-duration space exploration within our Sun's solar system.
- **Design** a solution that makes this problem better.
- **Share** the problem and solution with others.

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.

THE ROBOT GAME

Each team built and programmed an autonomous LEGO® MINDSTORMS® robot to solve missions on a playing field. Each mission represents the engineering and science behind space travel.



THE ROBOT GAME MISSIONS

Teams must program their autonomous robot to achieve the goals of one or more of the following Missions:

- M01 Space Travel** — Send Payload rockets (carts) rolling down the Space Travel Ramp.
- M02 Solar Panel Array** — Angle the Solar Panels.
- M03 3D Printing** — Place a Regolith Core Sample into the 3D Printer, which will cause a brick to pop out. Deliver the brick elsewhere for more points.
- M04 Crater Crossing** — Cross the crater completely from east to west by driving directly over it.
- M05 Extraction** — Remove the core samples and deliver them.
- M06 Space Station Modules** — Remove and insert modules among the Habitation Hub's port holes.
- M07 Space Walk Emergency** — Help astronaut Gerhard get safely into the airlock chamber.
- M08 Aerobic Exercise** — Move the exercise machine's handle(s) to make the pointer advance.
- M09 Strength Exercise** — Lift the exercise machine's strength bar to its scoring height.
- M10 Food Production** — Move the push bar into the green scoring range so food can grow in space.
- M11 Escape Velocity** — Impact the strike pad hard enough to keep the spacecraft from dropping back down.
- M12 Satellite Orbits** — Move one or more satellites into outer orbits.
- M13 Observatory** — Rotate the observatory so that it points to a precise direction.
- M14 Meteoroid Deflection** — Send one or both Meteoroids independently to the Meteoroid catcher.
- M15 Lander Touch-Down** — Get the Lander to one of its targets intact, or at least get it to Base.

PENALTIES

Interrupt the Robot = 3 points each time. (maximum 6 penalties).
Penalty markers are placed in the southeast triangle by the referee.

