

# Introduction to *FIRST* LEGO League Challenge

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PRESENTED BY Qualcomm



**UNEARTHED**



**DECODE**

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**REBUILT**

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## Three *FIRST* Programs (K-12)

*FIRST* LEGO League:

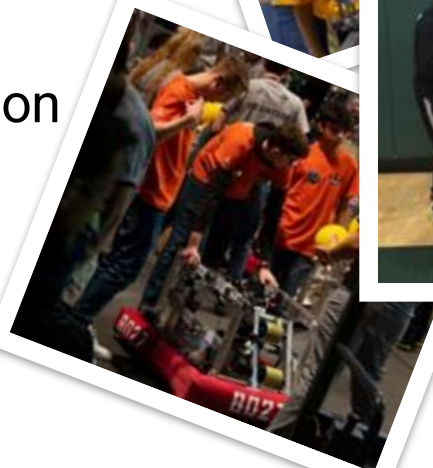
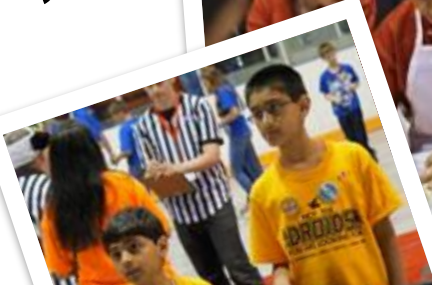
Discover

Explore

Challenge

*FIRST* Tech Challenge

*FIRST* Robotics Competition



“I don’t use kids to build robots. I use robots to build kids”

- Dean Kamen

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## Team

- North America (ages 9 to 14/grades 4-8); Elsewhere ( ages 9-16)
- Check with local organizers for variations
- Teams consists of 2-10 students
- Two official adult coaches with clearances per team
- Kids on the team do the work, coaches/mentors guide the overall process

## Approximate Timeline

**August 5, 2025:** Challenge documents released

**August-November 2025:** Team meets weekly to solve the challenge

**November-December 2025:** Qualifiers

**December 2025 - February 2026:** State/Regional Championship

**April 2026:** World Championships

**May-June 2026:** Official Open Invitationals run by Program Development Partners

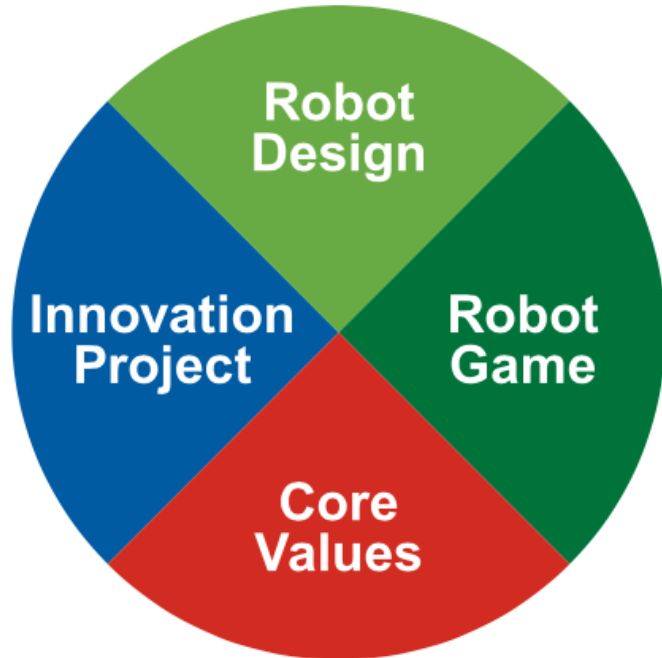
Timelines vary by region. Contact your local organizers for specifics.

## Team Costs

- LEGO Robot - approx. \$500.00 (Core Set + Expansion Set)
  - SPIKE Prime, MINDSTORMS EV3, MINDSTORMS Robot Inventor
  - Purchase from *FIRST* or directly from LEGO Education
- Wooden Robotics Table – approx. \$100.00
- National Team Registration – \$275
- Challenge Set - \$75 (expect 2%-4% increase)
- Local Tournament Registration Cost - \$75-250+
- Travel Expenses
- Team Shirts/Supplies

Cost vary by region. Contact your local organizers for specifics. Above costs are in USD and for North America only.

## Four Parts of *FIRST* LEGO League Challenge



- Four equally weighted parts  
Each accounts for 25% of your total performance
- Evaluated using rubrics and points scored on the game



# Innovation Project

## **Innovation Project is based on a yearly theme**

**2024-25 SUBMERGED** – Solve a problem related to ocean exploration

**2020-21 RePlay Season** - Help people get more active

**2017-18 Hydrodynamics Season** - Improve the way people find, transport, use, or dispose of water

**2014-15 World Class** – Improve the way we learn something

## Research Project Process

- **Identify** a problem
- **Design** a solution
- **Create** a prototype
- **Share** the solution
- **Iterate** your design



## Sample Project (SUBMERGED)

### PROBLEM:

- Marine biologists and experts find sampling and carrying seafloor sediments (20 - 40 m) to be difficult
- Embedding the corers is hard, even sometimes having to use small hammers to do it
- They must be kept in a vertical position to not mix the different layers of collected samples

### EXISTING SOLUTIONS

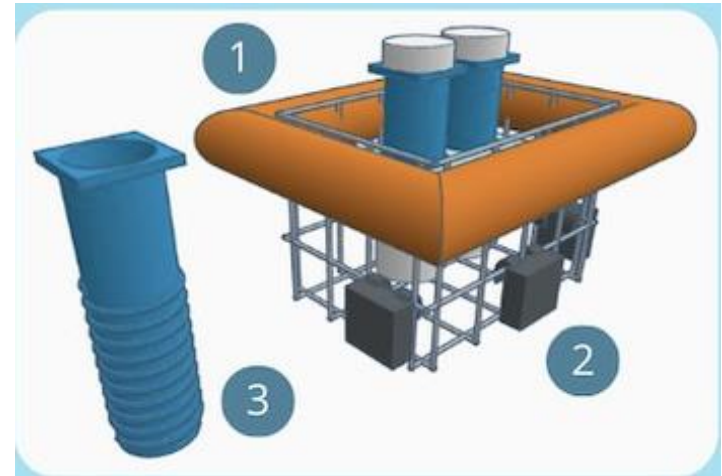
- Baskets to transfer corers vertically must be carried by hand
- Nets to store the corers can still tip over.
- In both cases, balloons can be used to lift samples to the surface, although they must be inflated with air from the diver's tank and their pressure needs to be controlled while ascending

## Sample Project (SUBMERGED)

### SOLUTION: ScuBasket

Basket that holds 6 corers that descends to the seafloor and comes back up on its own.

1. An inflatable connected to a small CO<sub>2</sub> bottle activated by the diver, with an automatic valve controlled by pressure.
2. A ballast to control the buoyancy and stability of the corers in vertical position.
3. Each corer has a screw-like shape to make the insertion into the seafloor easier, using a hand crank.



# Robot Game

## Overview

- 4ft x 8ft table with a mat
- LEGO-based missions
- LEGO MINDSTORMS or SPIKE Prime to solve the missions
- Theme changes early
- 2 tables placed next to each other at competition



## Robot Runs

- 3 matches, best score counts
- 2.5 minutes to complete as many missions as you can (Note: majority of teams will not do all the missions)
- Points vary by mission
- Each mission has its own set of rules and instructions
- Referees score you at the end of each match using a scoresheet

### ROBOT GAME RULEBOOK

**Team 1**   **Match:**   **Referee:**   **Table:**

**TEAM INITIALS:**

**Equipment Constraints:** When this symbol appears to the left of a mission, the following equipment is required. The equipment may be using any part of this season's mission board at the end of the match, to score for this mission.

**EQUIPMENT INSPECTION**  
If your robot and all of your equipment fit completely in one launch area and are under a height limit of 12 in. (305 mm) during the pre-match inspection. **20**

**MISSION 11 CORAL REEF**  
If the coral reef is hanging on the coral tree support. **20**  
Bonus: If both robots are in the coral reef. **10**  
If the coral reef is flipped up. **20**

**MISSION 12 SHARK**  
If the shark is no longer touching the coral. **20**  
If the shark is touching the coral and it is at least partly in the shark habitat. **10**

**MISSION 13 CORAL REEF**  
If the coral reef is hanging on the coral tree support. **20**  
If the coral reef is flipped up and touching the coral. **5 EACH**

**MISSION 14 SCUBA DIVER**  
If the scuba diver is no longer touching the coral. **20**  
If the scuba diver is hanging on the coral tree support. **20**  
One team member must be in the water at the end of the match.

**MISSION 15 ANGLER FISH**  
If the angler fish is no longer touching the shipwreck. **20**

**MISSION 16 RAISE THE MAAT**  
If the angler fish is completely raised. **20**  
If the angler fish is completely raised and the angler fish is no longer touching the shipwreck. **20**

**MISSION 17 HAKEN'S TREASURE**  
If the treasure chest is completely outside the robot's head. **20**

**MISSION 18 ARTIFICIAL HABITAT**  
If an artificial habitat each segment is completely flat and caught. **10 EACH**  
There are four segments in the artificial habitat piece, each defined by its public base. A segment is considered caught when the coral is above the public base.

**SCORE**

**MISSION 9 UNEXPECTED ENCOUNTER**  
If the unknown creature is released. **20**  
If the unknown creature is at least partly in the coral reef. **10**

**MISSION 10 READ OVER THE SUBMERISABLE**  
If the submerisable is clearly closer to the opening hole. **20**  
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**FINAL SCORE**  
Final score is equal to the sum of all values in the score column.

**Gracious Professionalism™ displayed at the robot game table:**

DEVELOPING	ACCOMPLISHED	EXCELLENCE
2	5	6



## 2025-26 Season: UNEARTHED (Archaeology)



# Robot Design

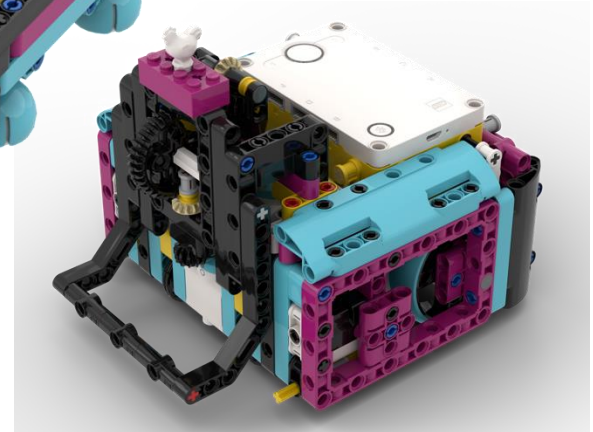
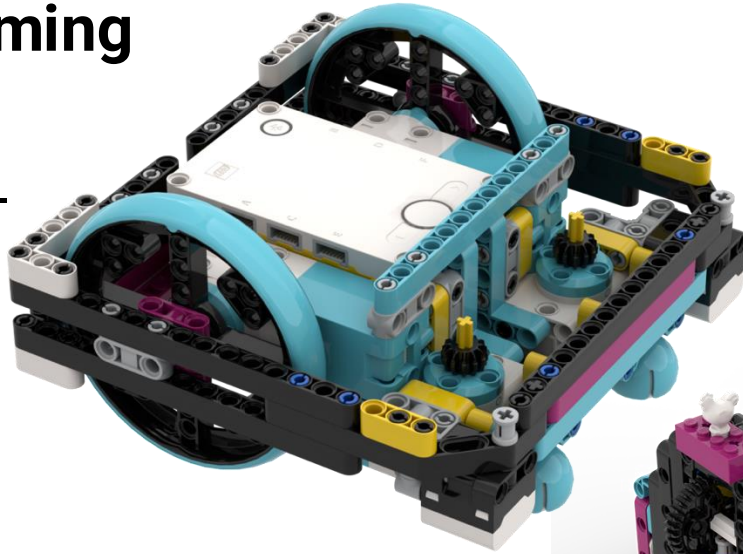
## Focus on the Engineering Design Process

- Step 1:** Analyze the missions and develop a strategy
- Step 2:** Build and program a robot to meet that strategy
- Step 3:** Test the robot and make improvements as needed
- Step 4:** Develop solutions to individual missions
- Step 5:** Test code and solutions
- Step 6:** Iterate code and robot as needed
- Step 7:** Document the process to share with judges



## Building and Programming

- Programming in block-based or text-based languages
- Learn physics and engineering concepts
- Optional CAD skills



# Core Values

## What are Core Values?

- The cornerstones of the program
- The set of ideas that every FIRST team should live by



We are stronger  
when we work  
together.



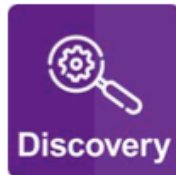
We respect  
each other and  
embrace our  
differences.



We apply what we  
learn to improve  
our world.



We enjoy and  
celebrate what we  
do!



We explore new  
skills and ideas.



We use creativity  
and persistence to  
solve problems.



## What is Gracious Professionalism and Coopertition?

### Gracious Professionalism:

- High-quality work, emphasis on the value of others
- Respect for individuals and the community.
- Competition and mutual gain are not separate notions.

### Coopertition:

- The idea you should respect and support teams you compete against.



## Learning Life Skills through *FIRST*

- Teamwork
- Communication
- Problem Solving
- Helping one another
- Giving back to community





# Our Team

# Meeting Times/Attendance Requirements

Fill in

# How do you join the team?

Application

Tryouts

Recommendation Letter

# Team Expectations

Cost:

Attendance:

Behavior/Code-of-Conduct:

Parent support and Involvement: