FIRST LEGO League

Robot Game

ROBOT GAME | PROJECT

CORE VALUES

Robot Game Basics

- ✔ This season is about Energy - collect energy and deliver it where it is needed
- ✔ Launch from either of two launch areas
- ✔ Return to either home before launching again
- ✔ Autonomous Robot
- ✔ 2.5 min Game Match
- ✔ Only the robot can move objects
- ✔ Scores are at the end of the match
- ✔ Three matches – highest score counts
- ✔ Gracious Professionalism will be judged by referees (2, 3, or 4 points)

NEW!

Robot Game Basics

ROBOT GAME PROJECT
CORE VALUES

Rule Hierarchy:

- ✔ Robot Game Rule Book
- ✔ Robot Game Updates
- ✔ Table Referee
- ✔ Tournament Head Referee

Robot Game


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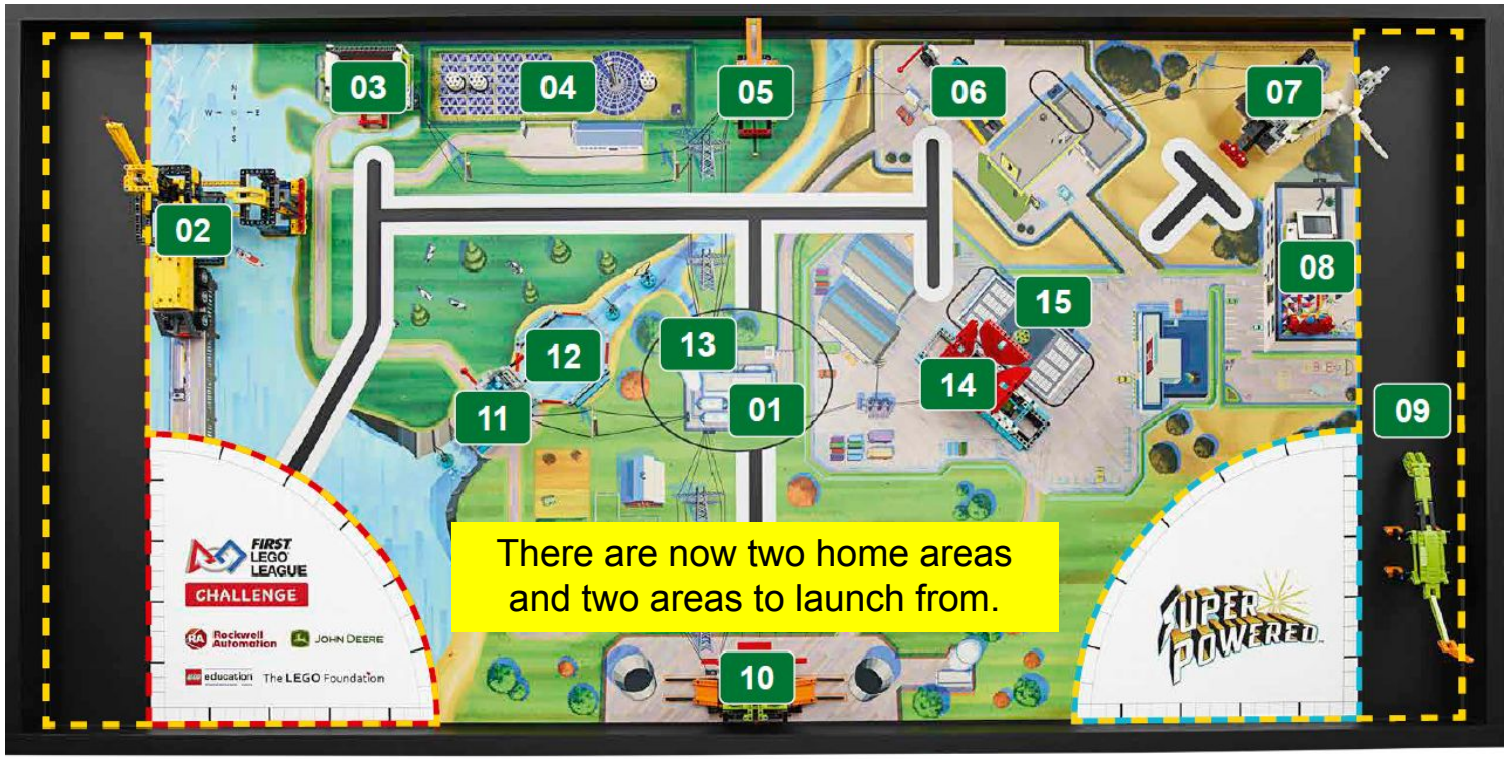
FIRST LEGO LEAGUE
CHALLENGE
Rockwell Automation
JOHN DEERE
education
The LEGO Foundation
SUPER POWERED

New this year…

The rules have been rewritten to account for all these changes, so please read through all materials carefully.



There are now two home areas and two areas to launch from.

Left Home | Left Launch Area | Right Launch Area | Right Home

Four technicians, two on each side, are allowed at the field.

Terms

- ✔ **Equipment:** Everything teams bring to the match.
- ✔ **Field:** This consists of the border walls and everything inside them.
- ✔ **Interruption**: When technicians interact with the robot or anything touching it after launch.
- ✔ **Launch:** When technicians activate the robot from completely within a launch area to move autonomously.
- ✔ **Match**: The 2.5 minutes when the robot completes as many missions as possible to earn points.
- ✔ **Mission**: One or more tasks that can be completed for points. Teams may try missions in any order or combination.
- ✔ **Robot**: Your controller and any equipment combined with it by hand and intended to not separate from it, unless by hand.
- ✔ **Technicians**: Team members standing at the table who are handling the robot during a match.

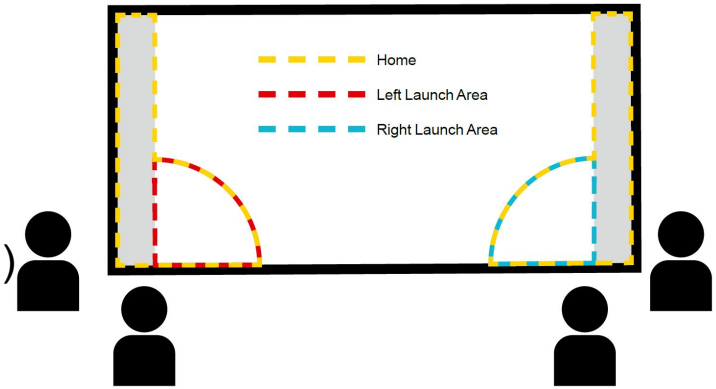
Equipment

- ✔ **1 Controller (Spike Prime, EV3 (Mindstorms), NXT, or RCX)**
- ✔ **Up to 4 Motors**
- ✔ **Sensors**: Only touch/force, color, distance/ultrasonic, and gyro sensors are allowed (any mix and number) in any one match.
- ✔ **Additional or duplicate mission models are not allowed.**
- ✔ **You may use any programming software/language (Mindstorms, Scratch, Python, RobotC, …)**

Before The Match | Match Setup

- ✔ Teams will not be given additional storage space. Storage tables or trolleys are not allowed. Everything must stay on the table or in the hands of a technician.
- ✔ After the team has passed inspection, they will be given a couple of minutes to set up. They start by distributing their equipment and loose mission model(s) between the two home areas.

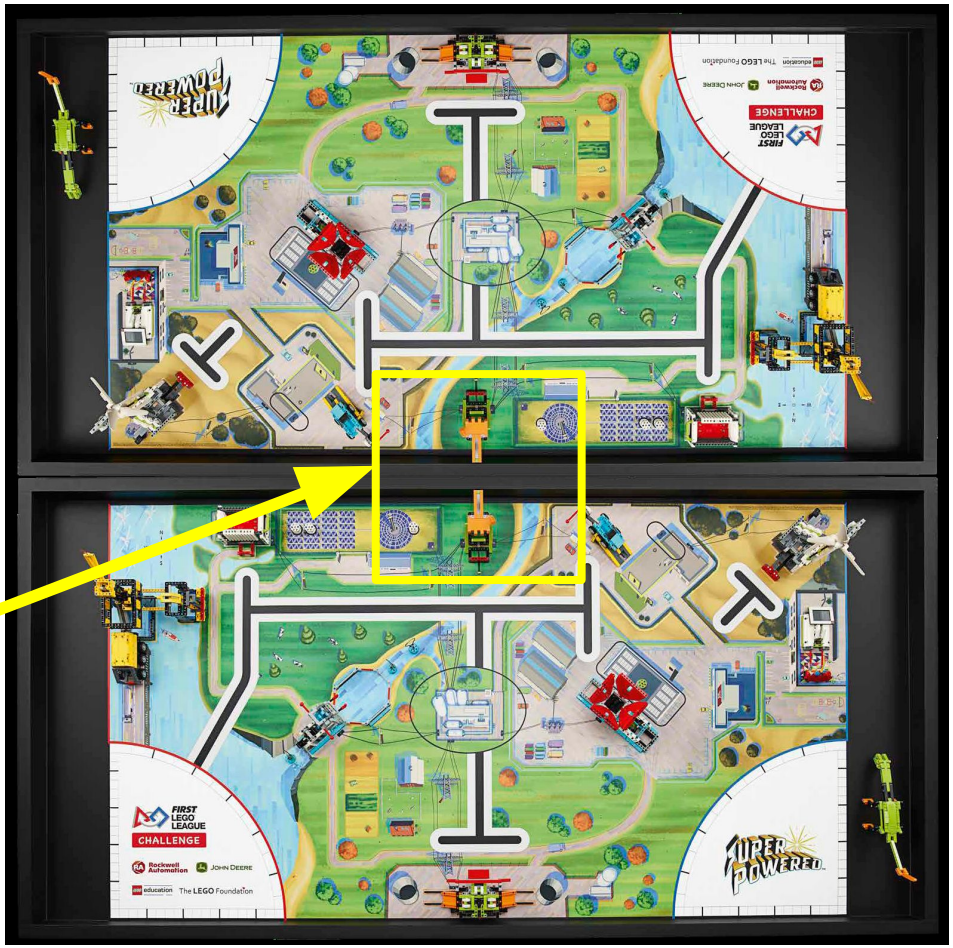
- ✔ Team members must then divide into two groups and position one group at each side of the field (left and right).
- ✔ These members cannot switch sides during the match.
- ✔ If possible, position two technicians at each home area.
- ✔ All other team members must stand back.
- ✔ Other team members may swap places with technician(s).



2 Teams Compete Simultaneously

- ✔ At **competition event**, two identical tables are joined together
- ✔ Two teams will compete simultaneously (same 2:30 time)
- ✔ No interference with other field/robot!
- ✔ Scored independently (EXCEPTION: Mission 05)

Mission 05 SMART GRID



Both teams: 20 + 10 points

During the Match | Inside Home

- ✔ Home is split into two areas. Each home area contains its own launch area.
- ✔ Technicians may use their hands on the robot, equipment, and mission models when these are completely within their home area.
- ✔ When launching:
  - Technicians may not keep anything from moving.
  - The robot and anything it is about to move must fit completely inside the launch area.
- ✔ Technicians may not touch anything outside of their home area or cause anything to move or extend outside this area, except the robot.
- ✔ **Technicians may not pass the robot directly from one home area to the other.**
- ✔ After any launch, technicians should allow the robot to return completely into home before interrupting it.
- ✔ **If you combine a mission model with anything (including the robot), the combination needs to be loose or simple enough tha[illegible]uld free the mission model in perfect original condition immediately.**

During the Match | Outside Home pt1

- ✔ If technicians interrupt their robot, it must be relaunched. If the robot was outside home (even partly) when it was interrupted, **they lose one precision token.**

- ✔ If the robot was partly outside home: Bring the robot into that home area.
- ✔ If the robot was completely outside home: Return the robot to either home area.

- ✔ If the object was with the robot when it launched: Keep it. Bring it with the robot.
- ✔ If the object was obtained after the robot was launched: Give it to the referee for the remainder of the match.
- ✔ Exception: If the team does not plan to launch again, they may stop their robot in place without losing a precision token. The robot and anything it is in contact with should remain in place where it was interrupted.

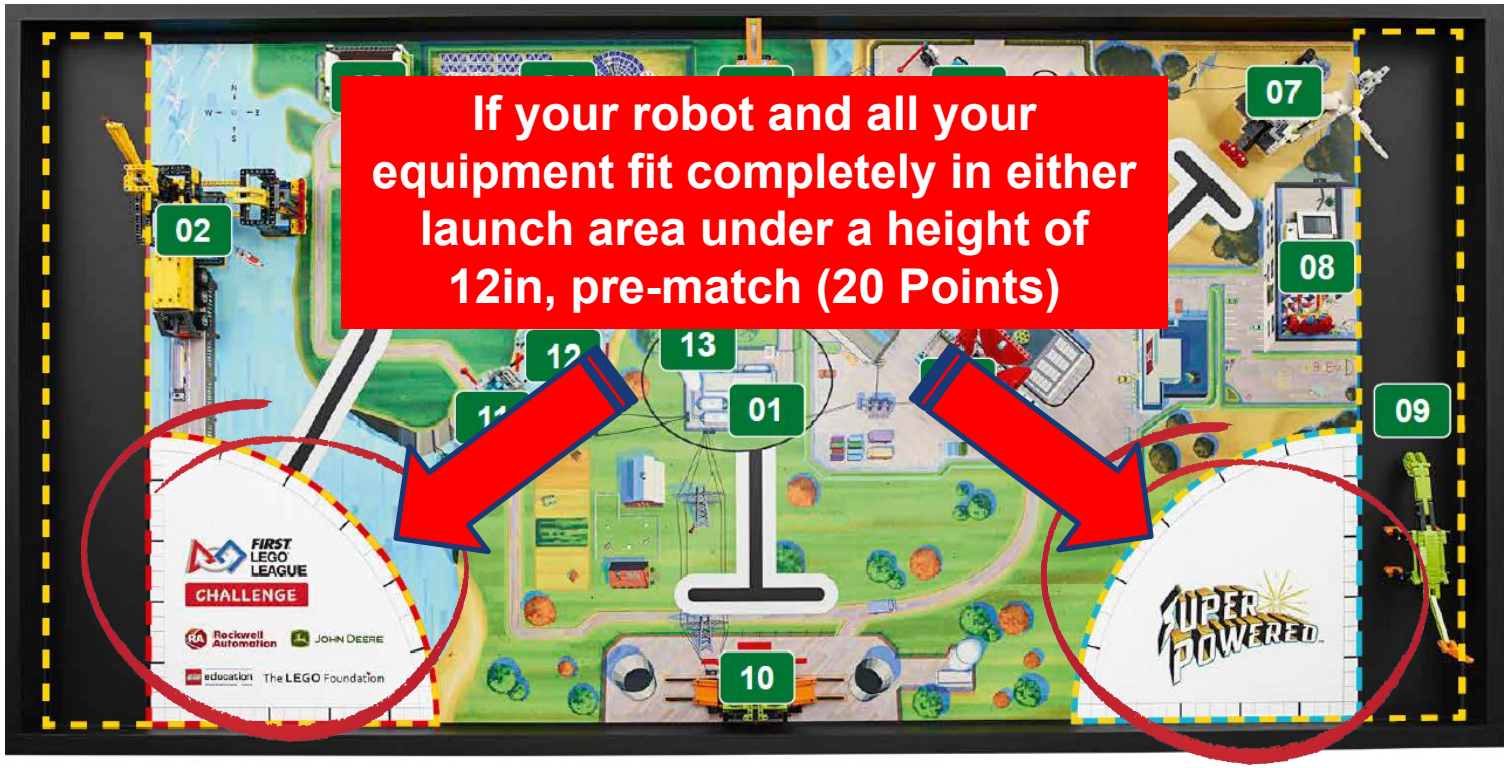
During the Match | Outside Home pt2

- ✔ If a piece of equipment or a mission model is dropped or left outside of home, wait for it to come to rest:
- ✔ If it rests completely outside home: It stays as is unless the robot changes it.
- ✔ If it rests partly in home: It stays as is unless the robot changes it.
- ✔ Alternatively, at any time, the technicians may remove it by hand.

If the object removed by hand was a mission model, it must be given to the referee for the remainder of the match. If the object was equipment, it must be taken into that home area, and the team will lose one precision token.

- ✔ Teams cannot separate the Dual Lock, take models apart, or break a mission model.
- ✔ Teams also may not interrupt their robot in such a way that they earn points from it. Points scored in these ways will not count.
- ✔ Teams may not interfere with the opposing field or robot unless there is a mission exception. Points failed or lost due to interference will sc e other team.

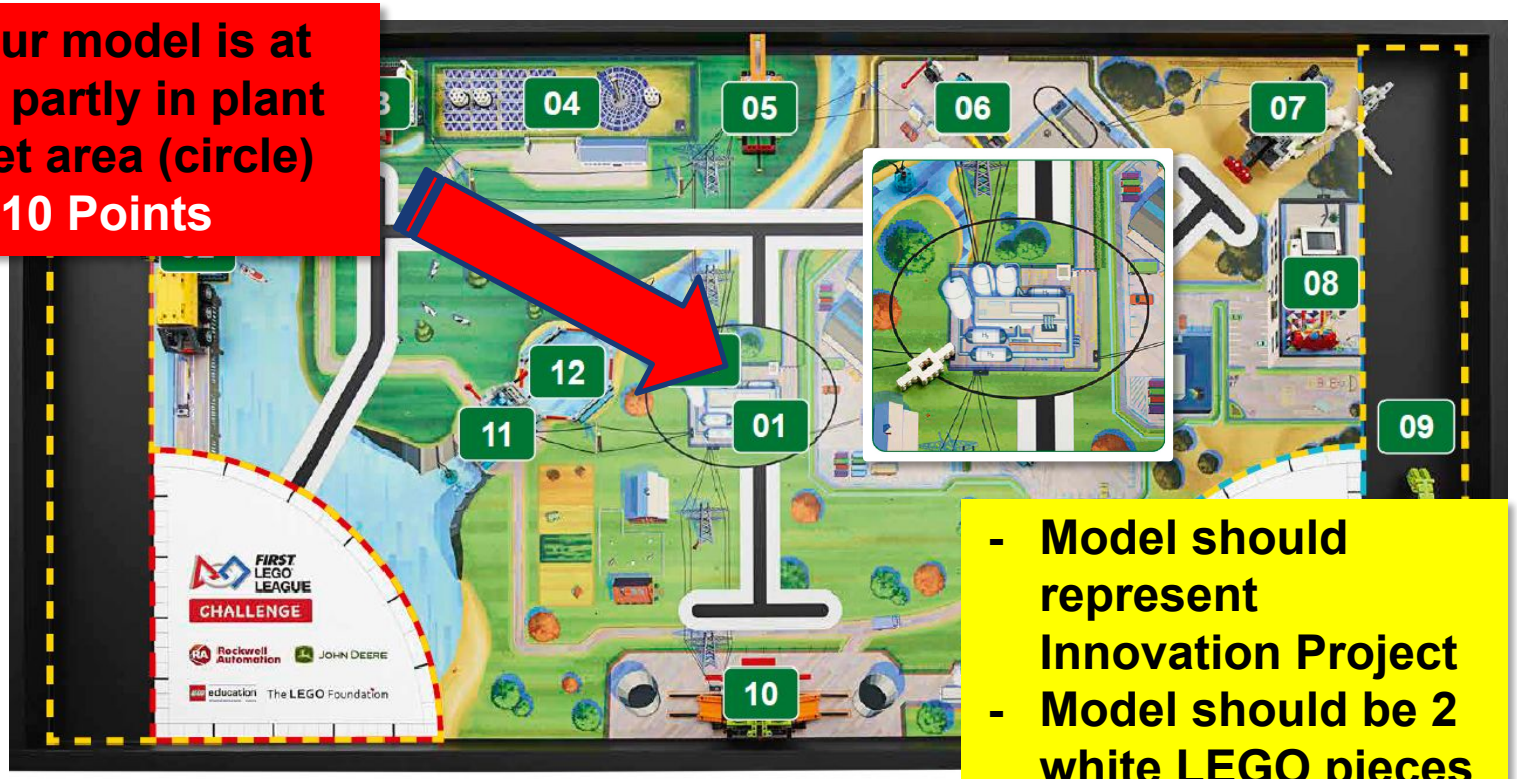
Equipment Inspection



Left Home | Left Launch Area | Right Launch Area | Right Home

Mission 1 – Innovation Project

If your model is at least partly in plant target area (circle)
10 Points



- **Model should represent Innovation Project**
- **Model should be 2 white LEGO pieces**
- **Measures at least four studs in some direction**

Left Home

Left Launch Area

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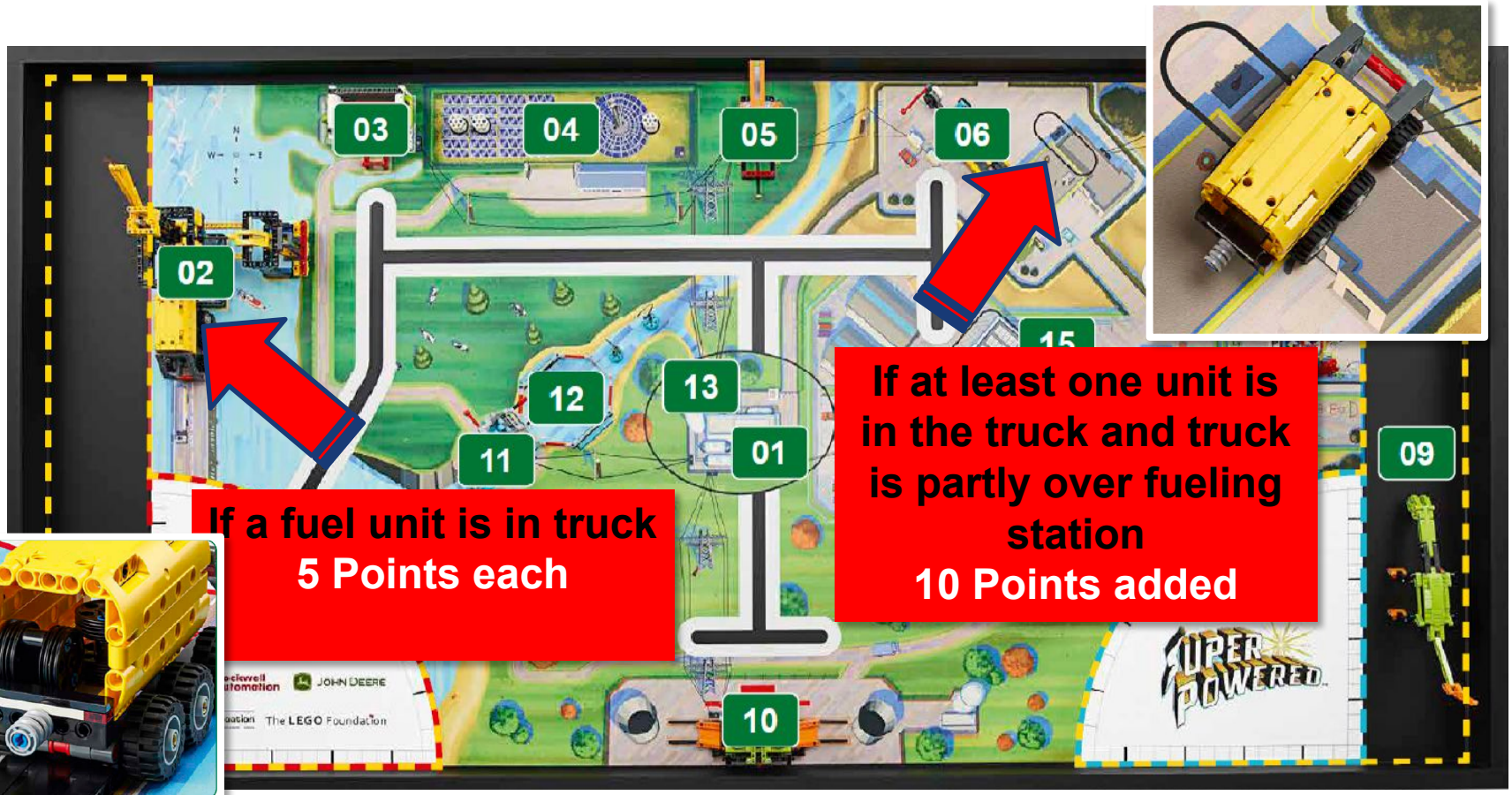
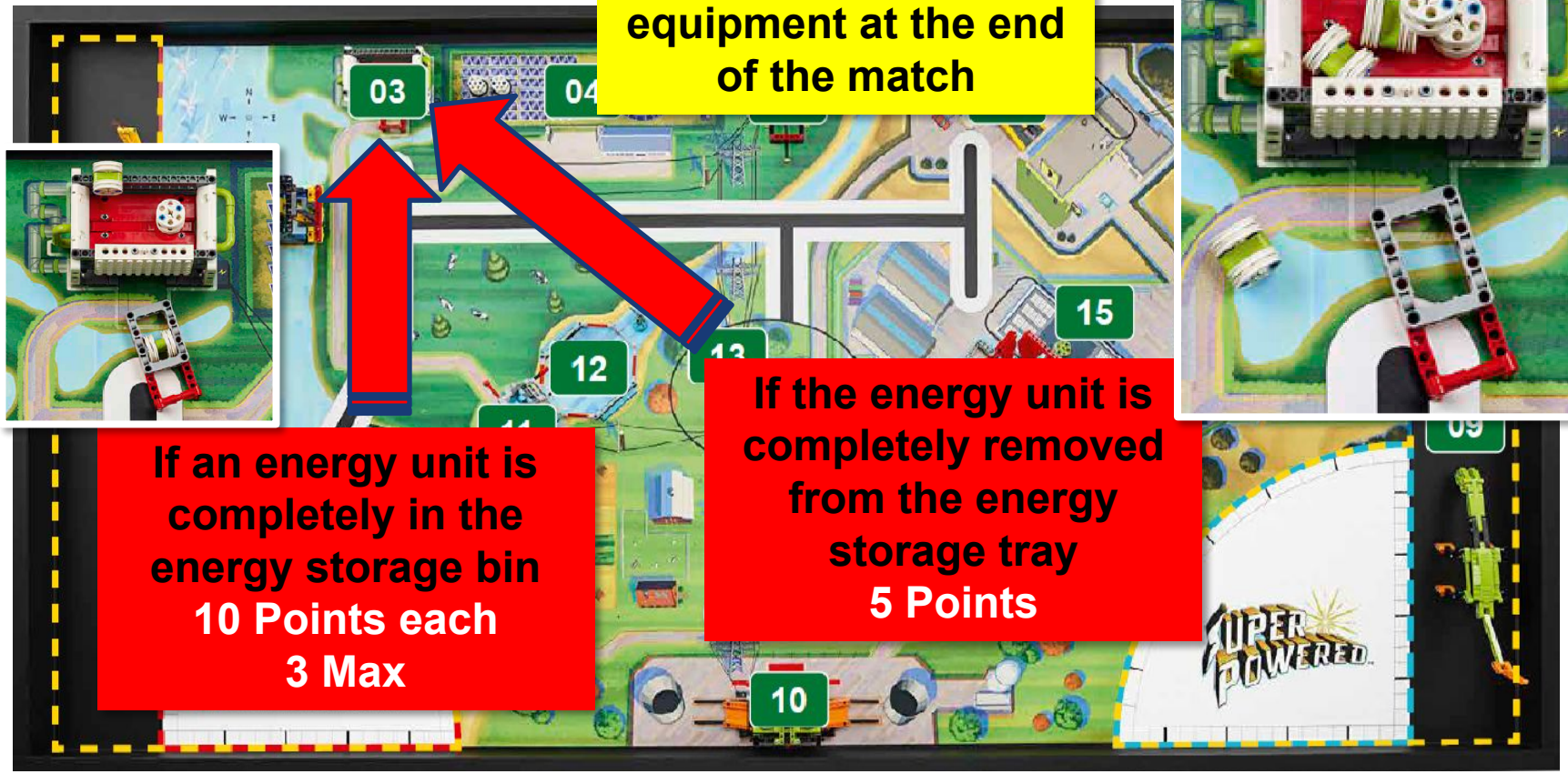
Mission 2 – Oil Platform



Mission 3 – Energy Storage

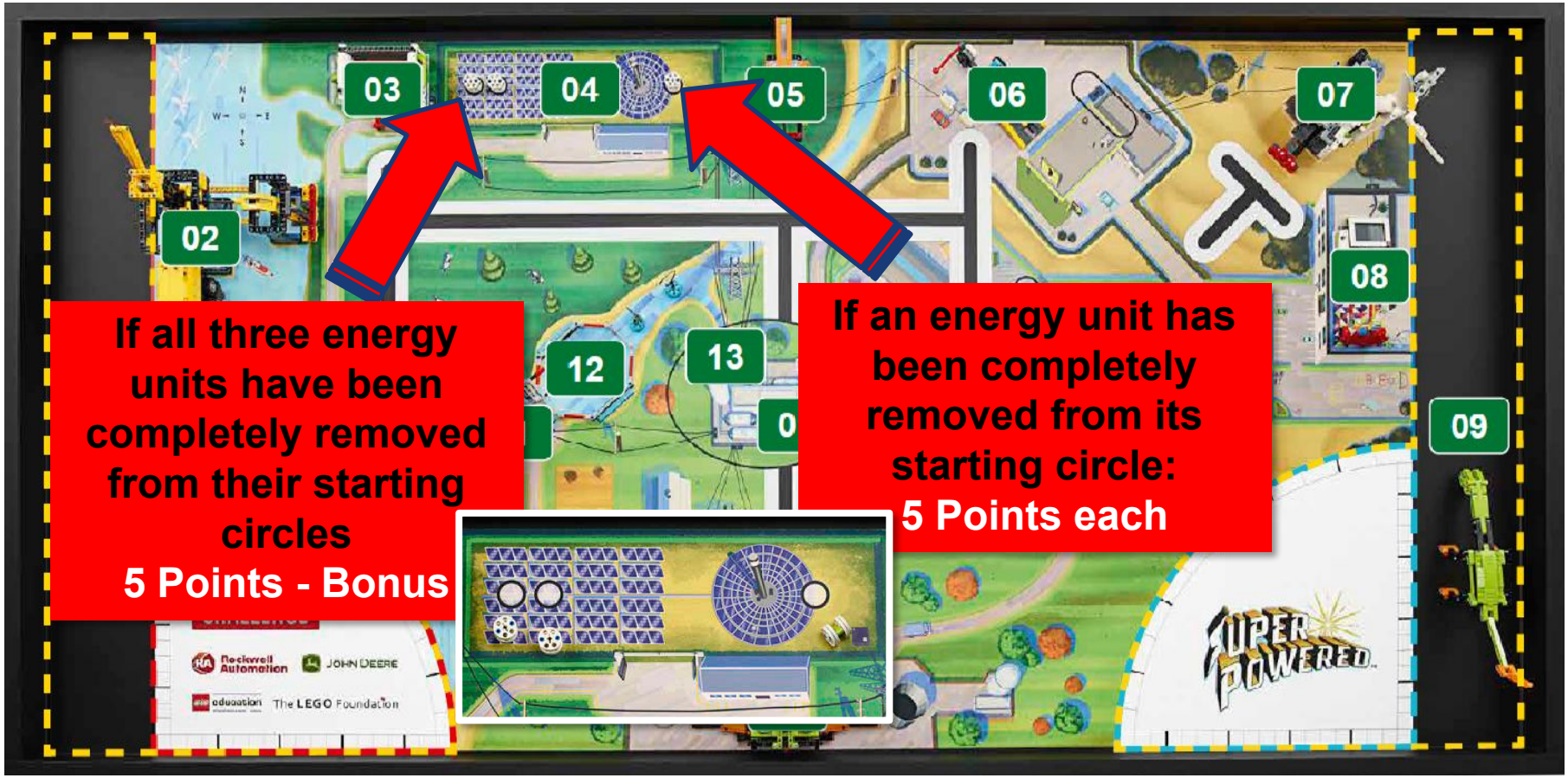
All energy units stored in the bin may not be touching team equipment at the end of the match



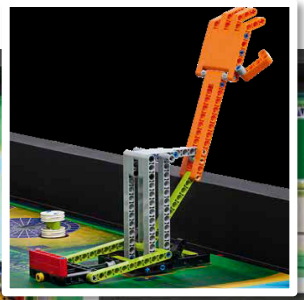
If an energy unit is completely in the energy storage bin
10 Points each
3 Max

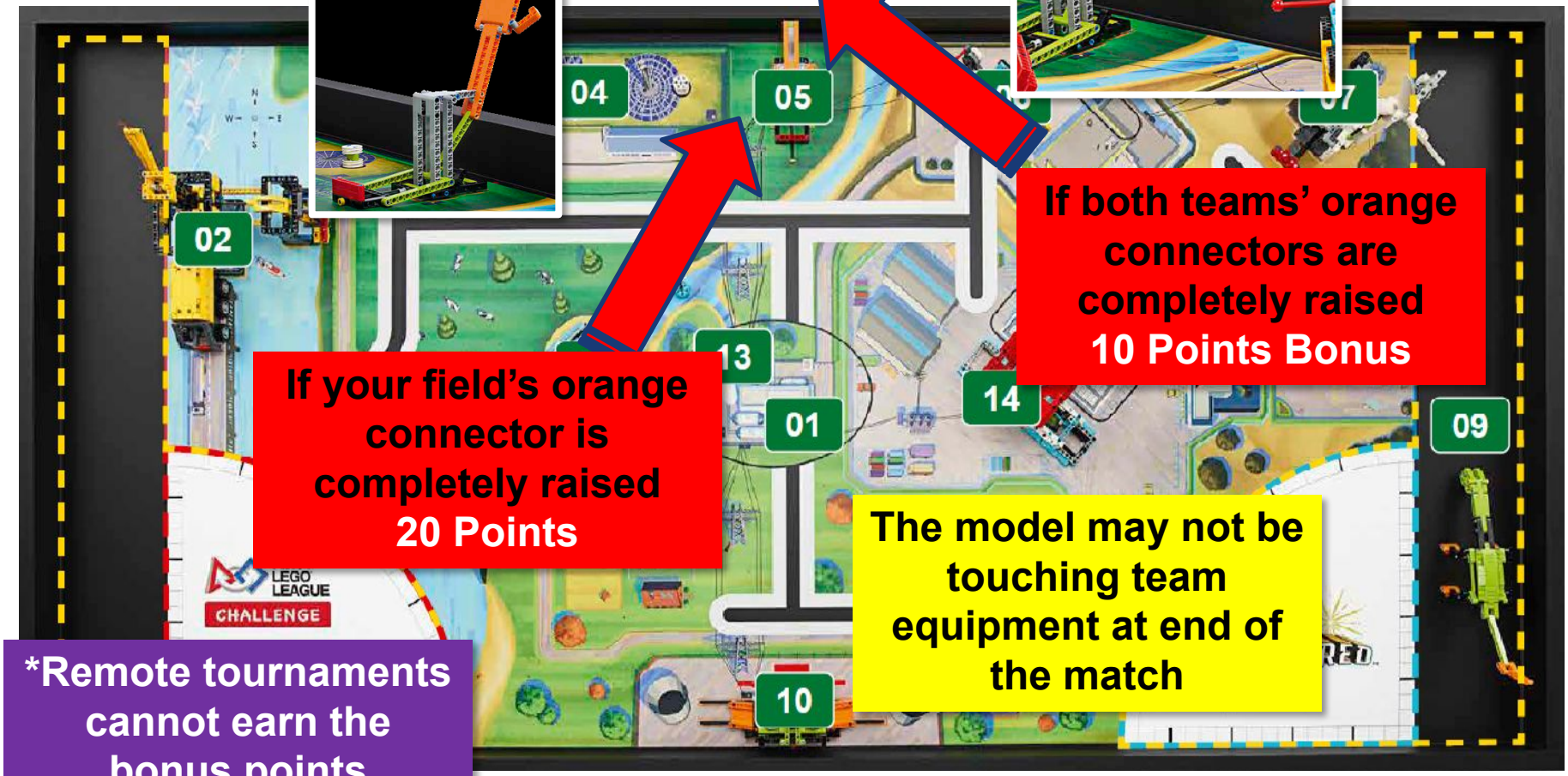
If the energy unit is completely removed from the energy storage tray
5 Points

Mission 4 – Solar Farm



Mission 5 – Smart Grid





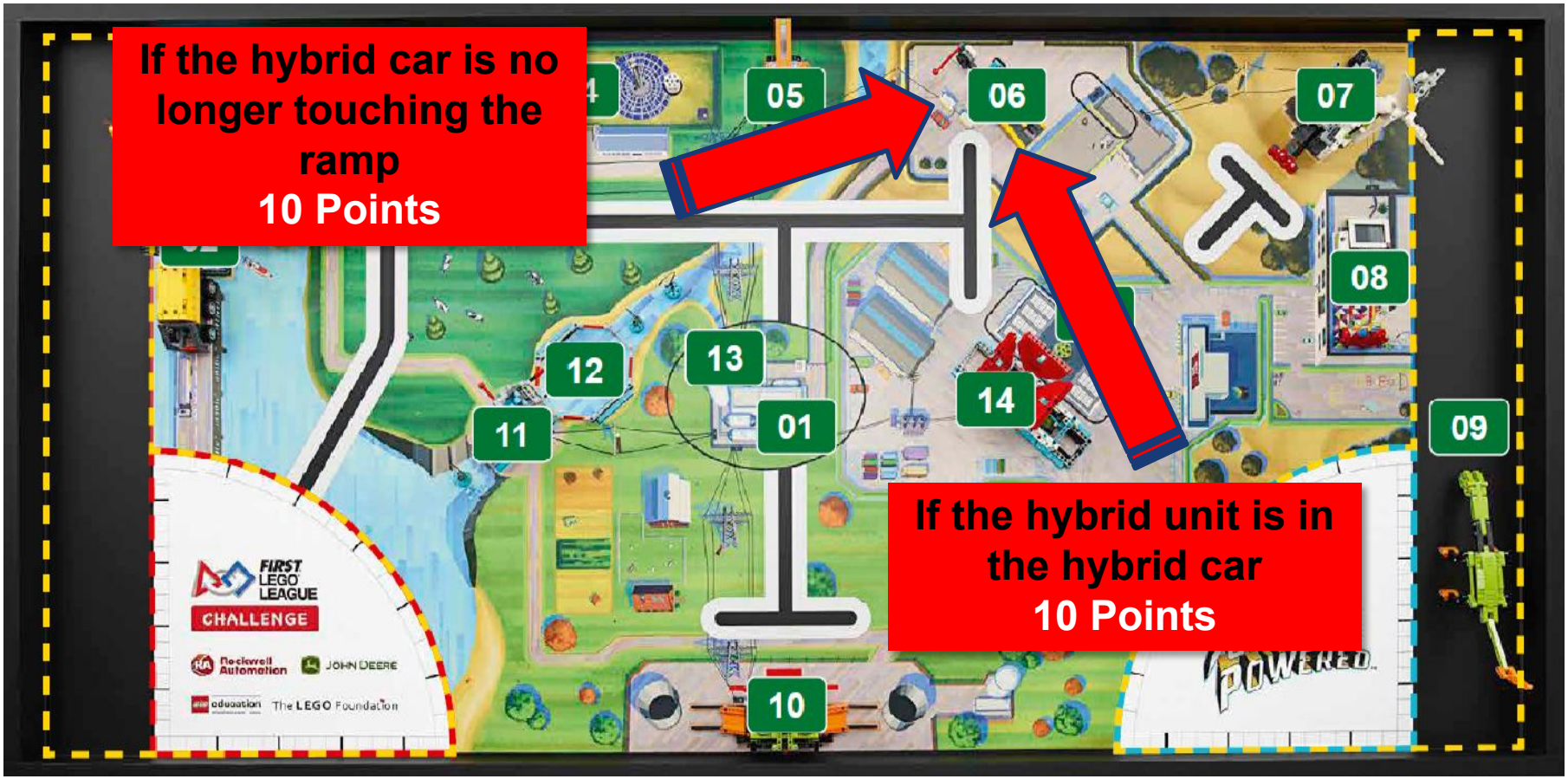
If both teams' orange connectors are completely raised
10 Points Bonus

If your field's orange connector is completely raised
20 Points

The model may not be touching team equipment at end of the match

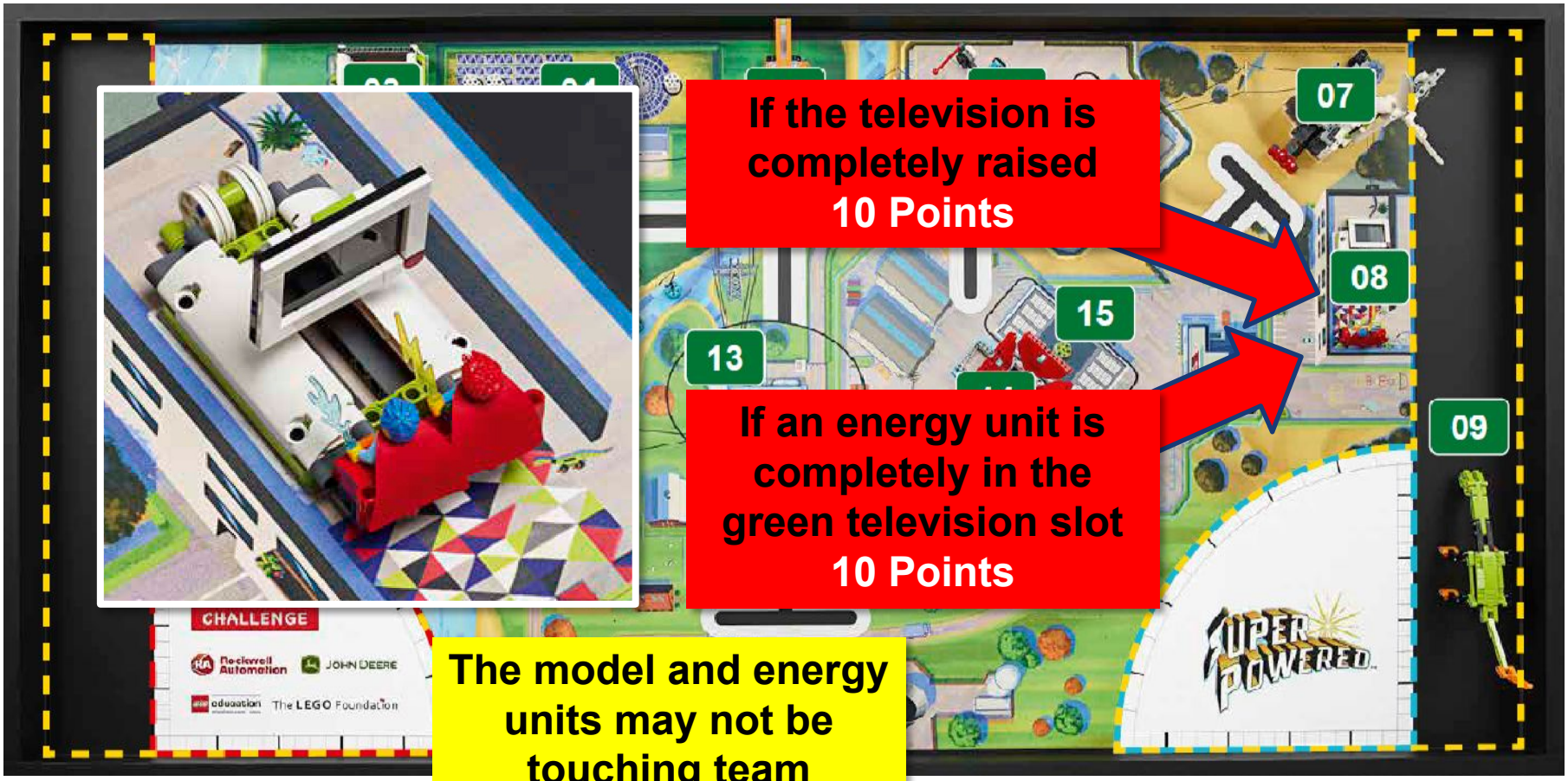
*Remote tournaments cannot earn the bonus points

Mission 6 – Smart Grid



Mission 7 – Wind turbine

Mission 8 – Watch Television



If the television is completely raised
10 Points

If an energy unit is completely in the green television slot
10 Points

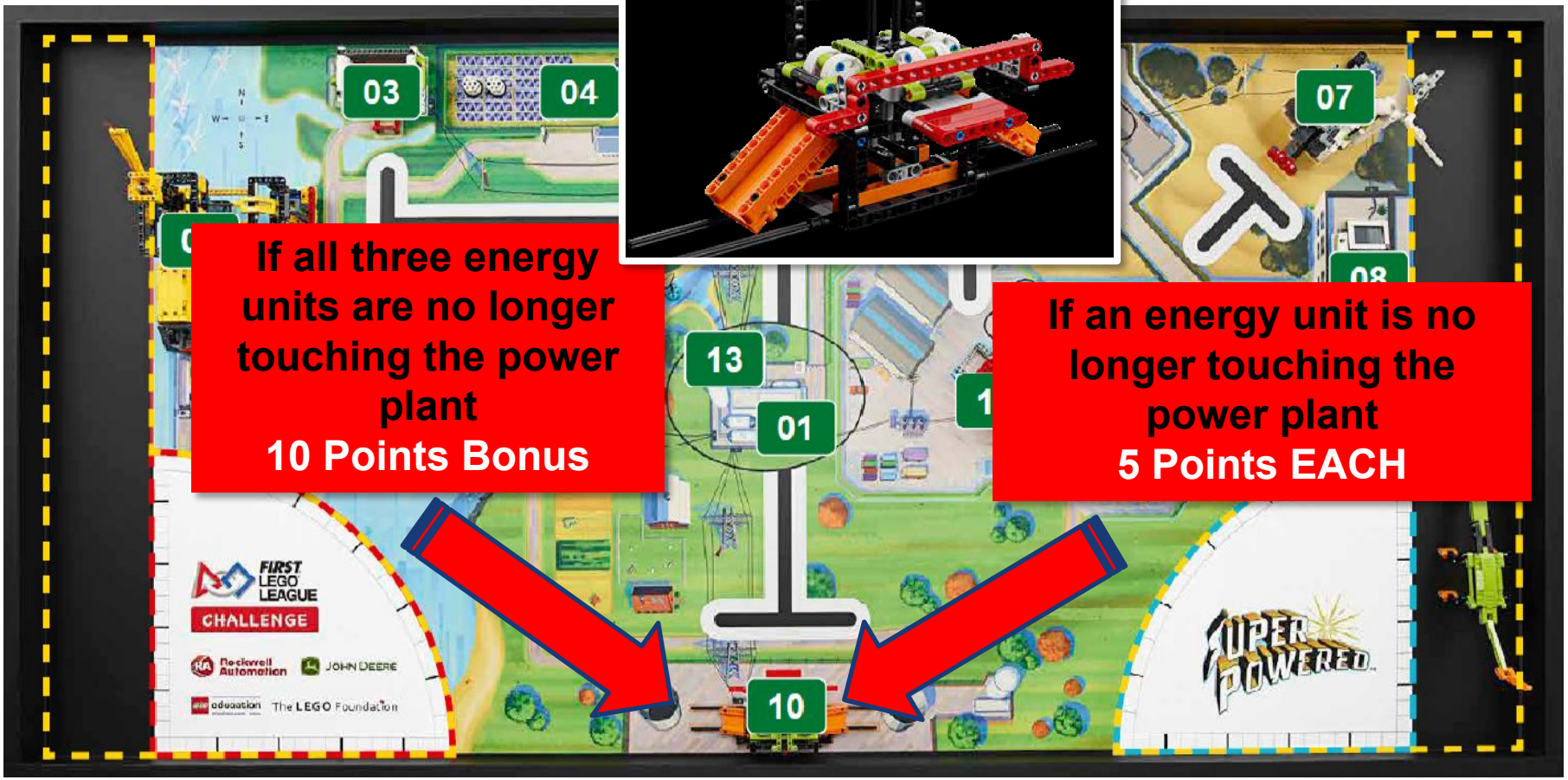
The model and energy units may not be touching team equipment at end of the match

Mission 9 – Dinosaur Toy

If the dinosaur toy is <u>completely</u> in the left <u>home</u> area
10 Points

If the dinosaur toy lid is completely closed:
a. There is an energy unit inside: 10 Points
Or
b. there is a rechargeable battery inside: 20 Points

Mission 10 – Power Plant

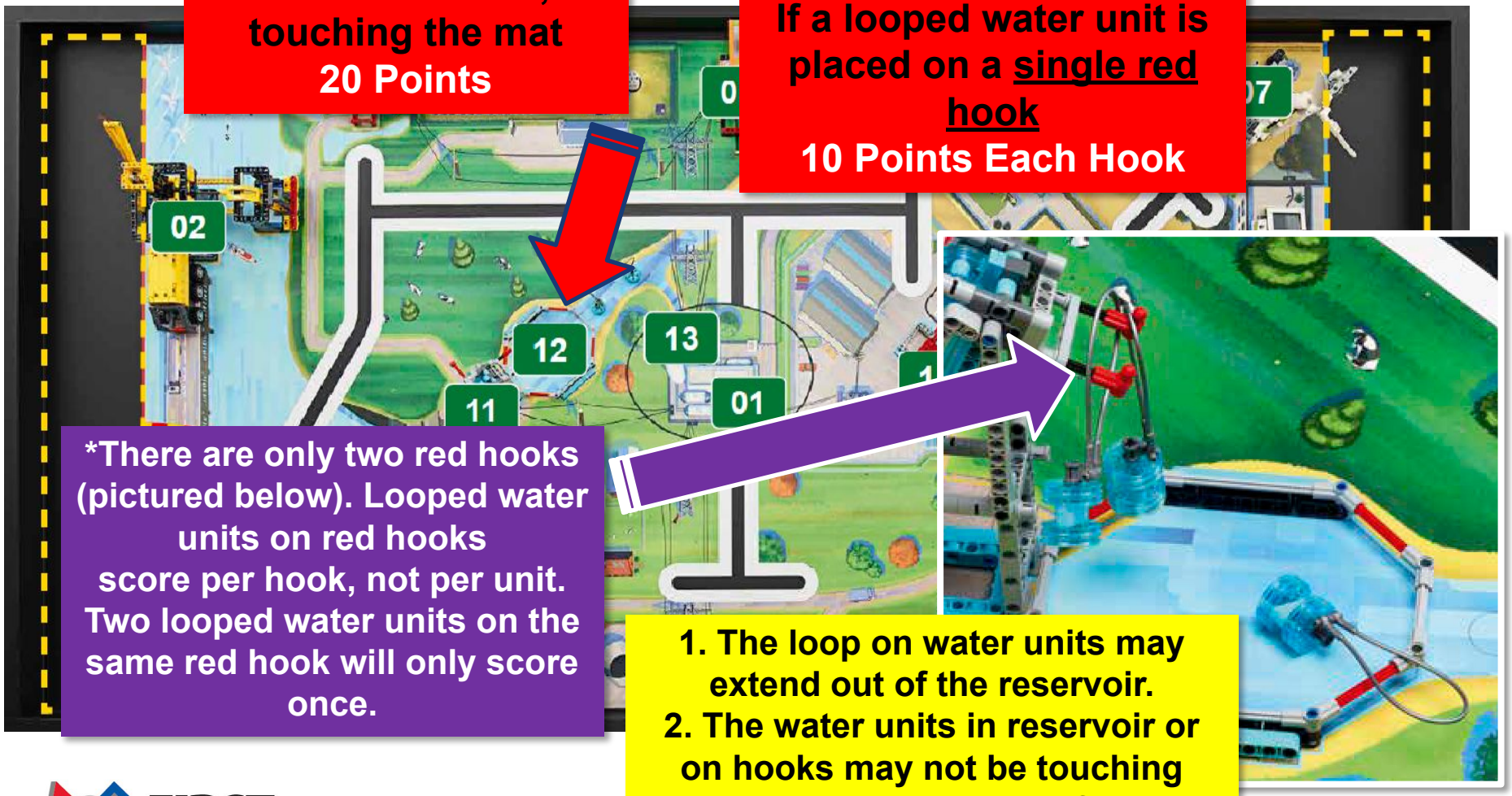


Mission 11 – Hydroelectric Dam

Mission 12 – Water Reservoir

If a looped water unit is completely in the water reservoir, touching the mat
20 Points

If a looped water unit is placed on a <u>single red hook</u>
10 Points Each Hook

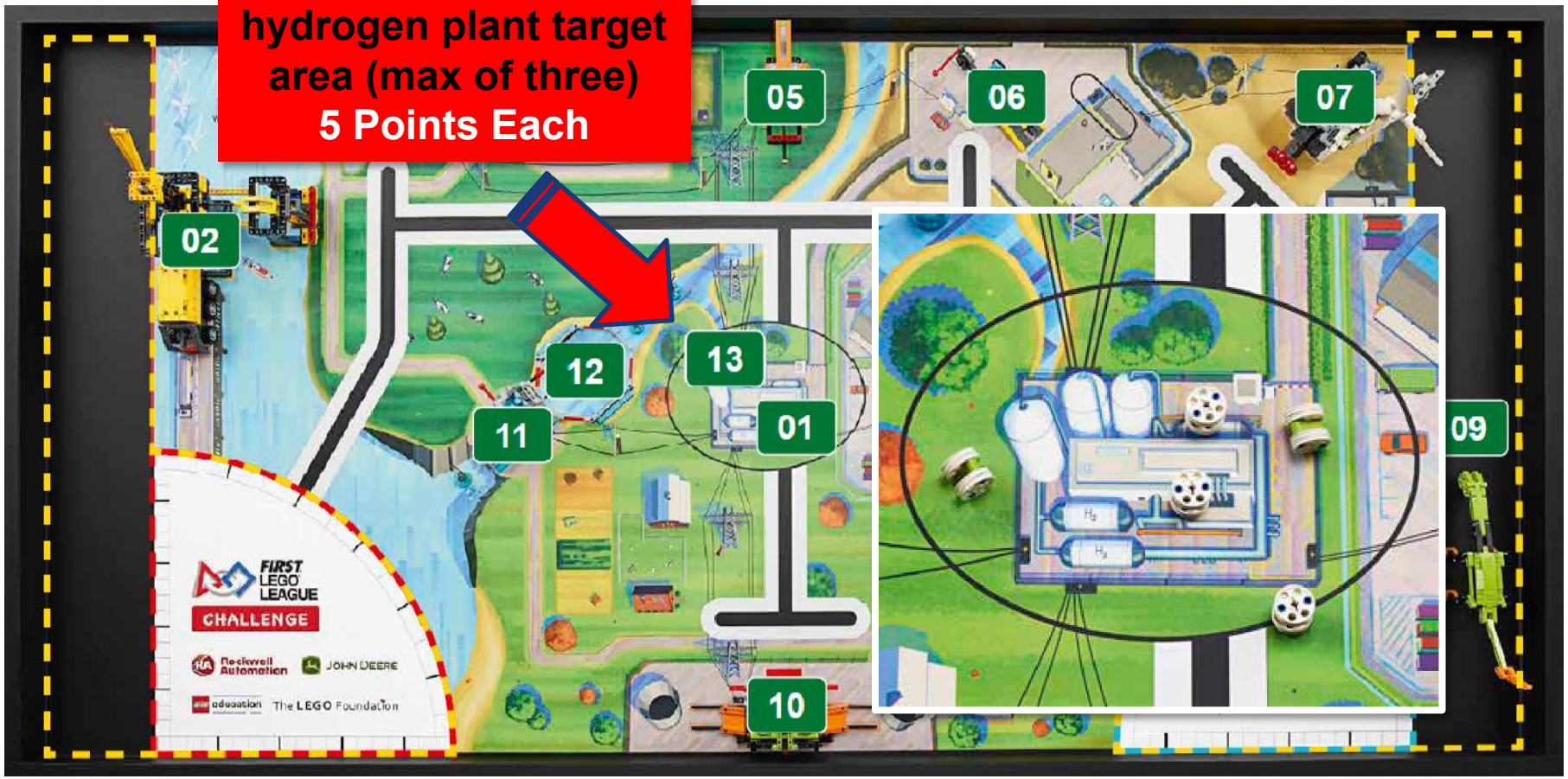


***There are only two red hooks (pictured below). Looped water units on red hooks score per hook, not per unit. Two looped water units on the same red hook will only score once.**

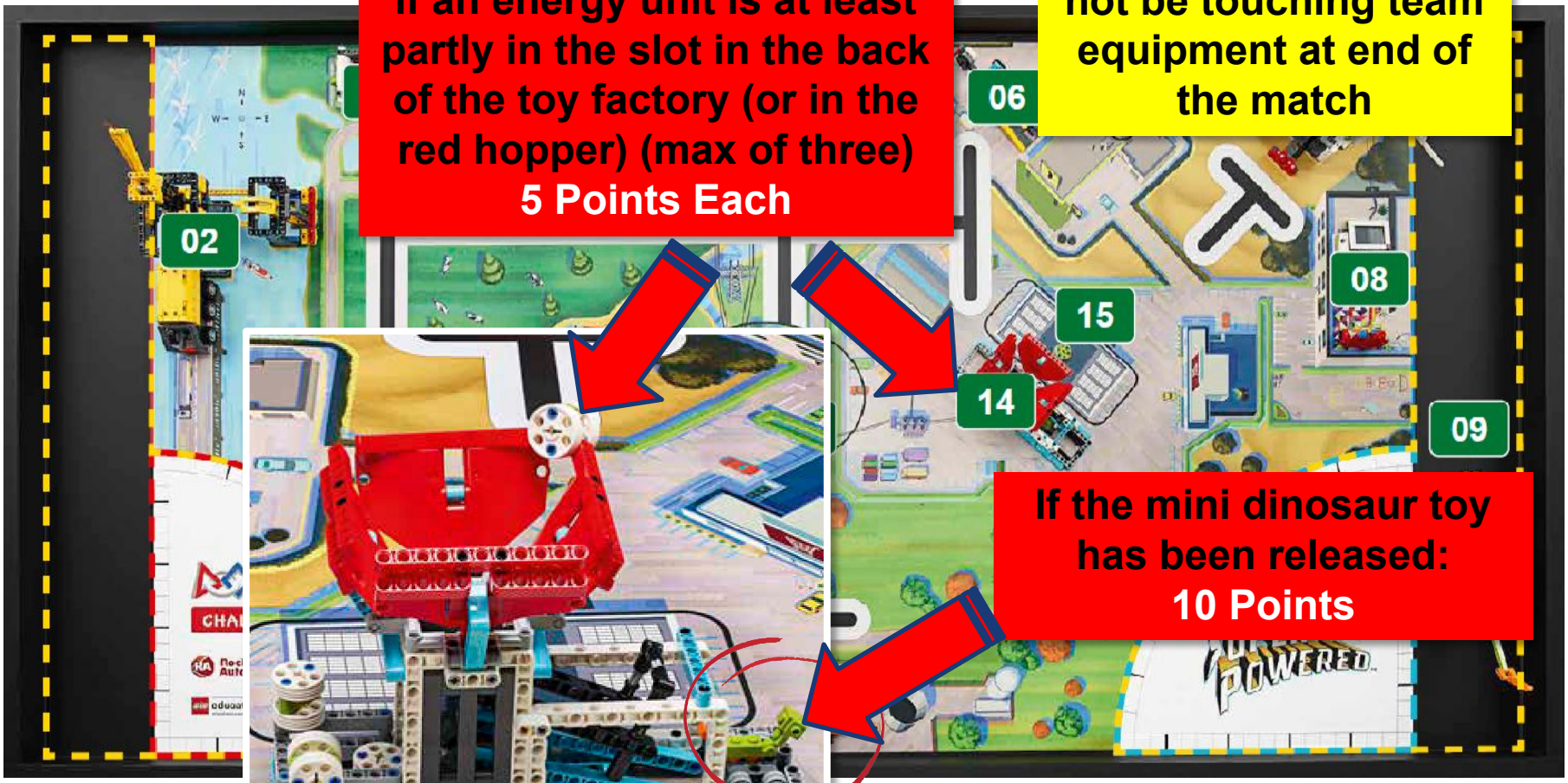
1. The loop on water units may extend out of the reservoir.
2. The water units in reservoir or on hooks may not be touching team equipment at end of match

Mission 13 – Power-to-X

If an energy unit is completely in the hydrogen plant target area (max of three)
5 Points Each



Mission 14 – Toy Factory



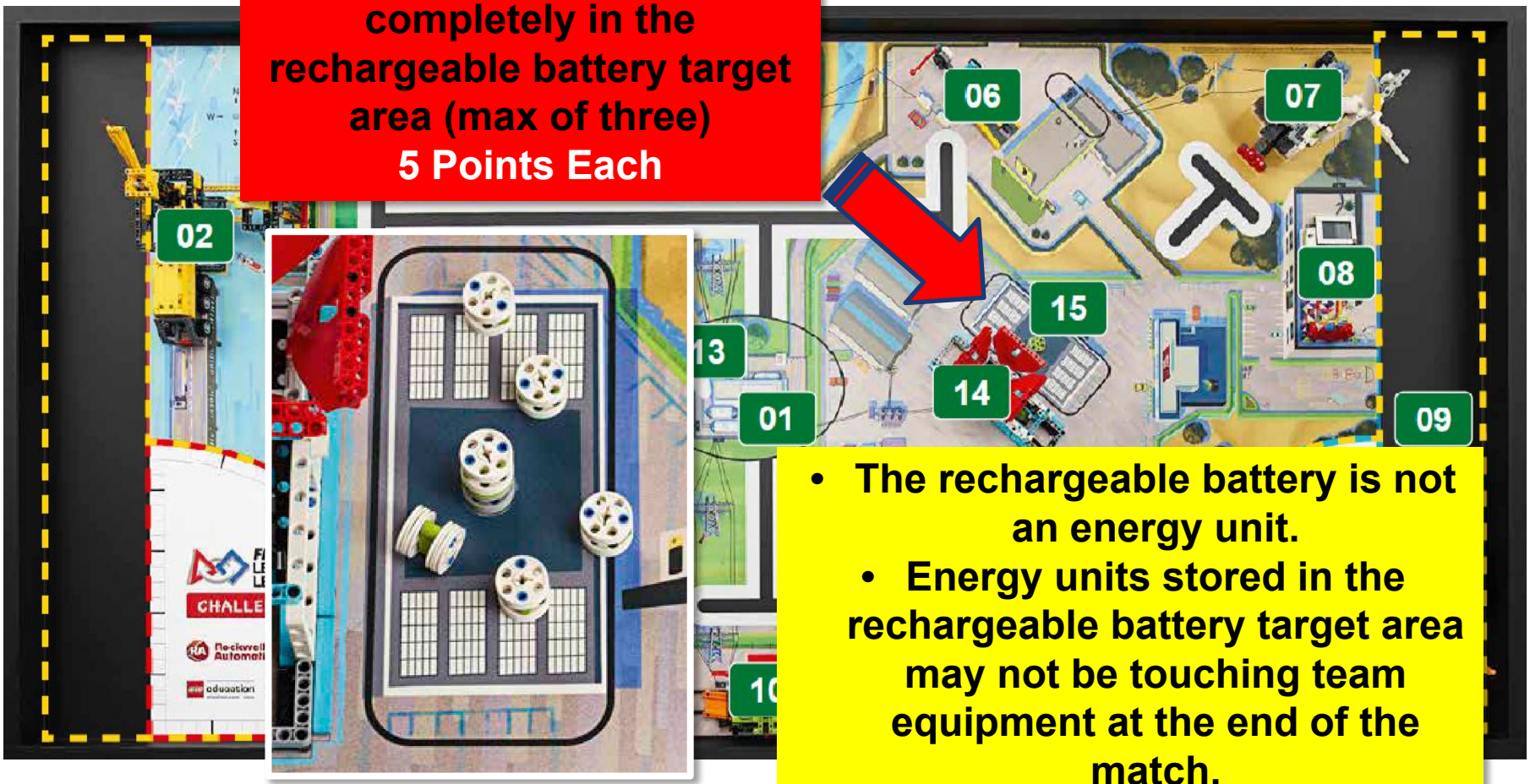
If an energy unit is at least partly in the slot in the back of the toy factory (or in the red hopper) (max of three)
5 Points Each

The energy units may not be touching team equipment at end of the match

If the mini dinosaur toy has been released:
10 Points

Mission 15 – Rechargeable Battery

If an energy unit is completely in the rechargeable battery target area (max of three)
5 Points Each



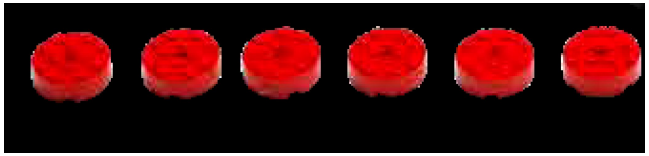
- **The rechargeable battery is not an energy unit.**
- **Energy units stored in the rechargeable battery target area may not be touching team equipment at the end of the match.**

Precision Tokens

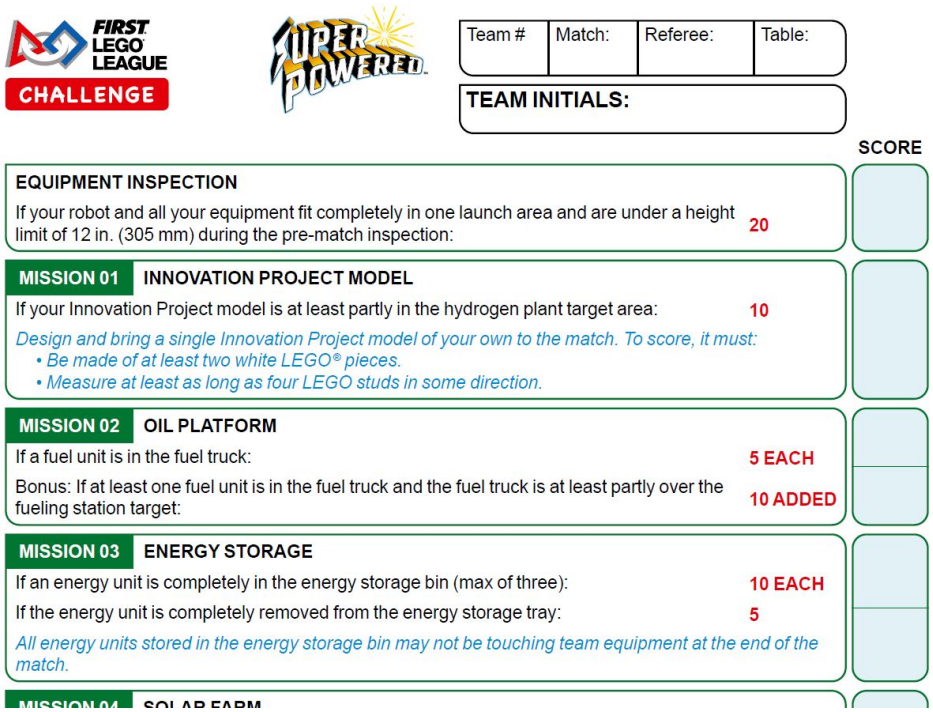
ROBOT GAME PROJECT
CORE VALUES

- ✔ You begin the match with six precision tokens worth 50 free points.
- ✔ The referee holds onto them.
- ✔ If you interrupt the robot outside of home, the referee removes one token.
- ✔ You keep points for the number of remaining tokens at the end of the match.
- ✔ If the number remaining is:

1: 10	3: 25	5: 50
2: 15	4: 35	6: 50



After Match: Score Sheet



FIRST LEGO LEAGUE CHALLENGE

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Team #	Match:	Referee:	Table:

TEAM INITIALS:

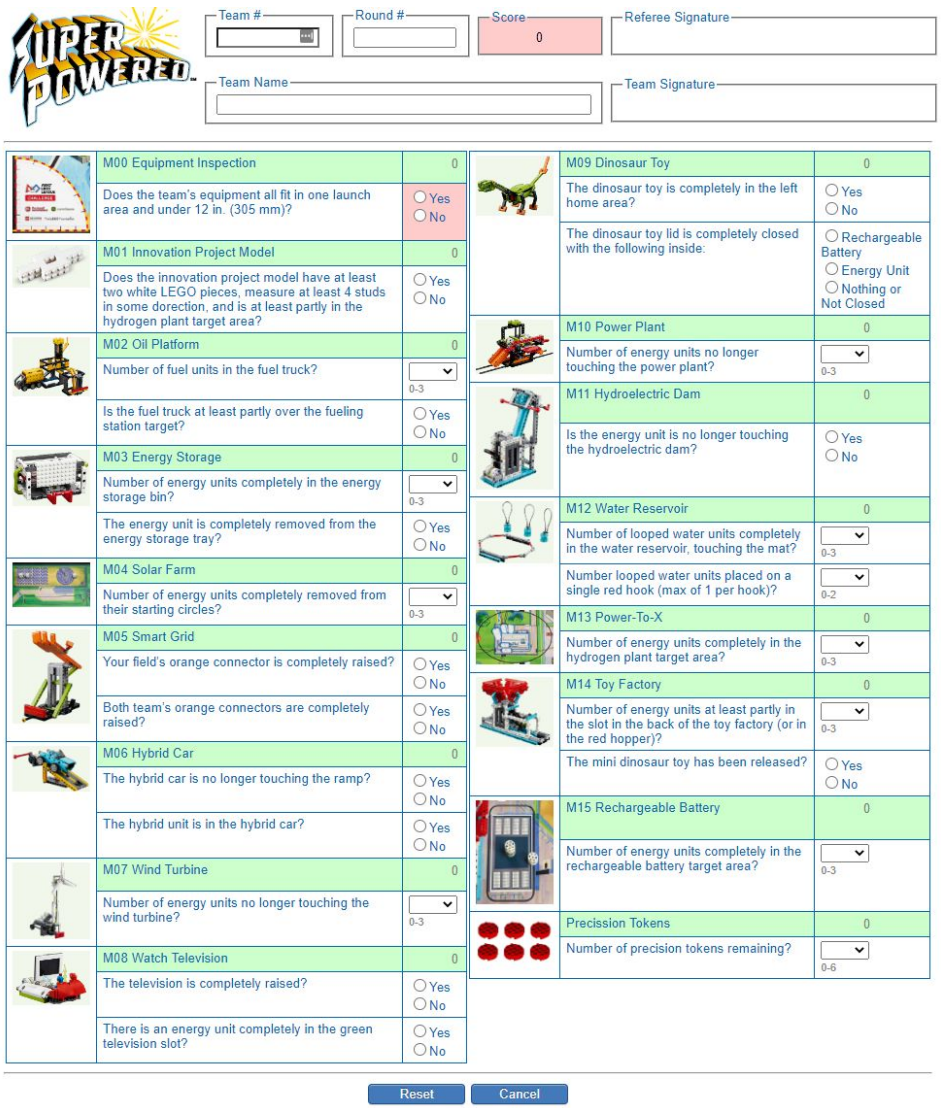
		SCORE
EQUIPMENT INSPECTION		
If your robot and all your equipment fit completely in one launch area and are under a height limit of 12 in. (305 mm) during the pre-match inspection:	20	
MISSION 01 **INNOVATION PROJECT MODEL**		
If your Innovation Project model is at least partly in the hydrogen plant target area:	10	
Design and bring a single Innovation Project model of your own to the match. To score, it must: • *Be made of at least two white LEGO® pieces.* • *Measure at least as long as four LEGO studs in some direction.*		
MISSION 02 **OIL PLATFORM**		
If a fuel unit is in the fuel truck:	5 EACH	
Bonus: If at least one fuel unit is in the fuel truck and the fuel truck is at least partly over the fueling station target:	10 ADDED	
MISSION 03 **ENERGY STORAGE**		
If an energy unit is completely in the energy storage bin (max of three):	10 EACH	
If the energy unit is completely removed from the energy storage tray:	5	
All energy units stored in the energy storage bin may not be touching team equipment at the end of the match.		
MISSION 04 **SOLAR FARM**		

- ✔ **Referee** completes the score sheet (not teaml, not coach), and explains scoring to team
- ✔ **WHAT'S OUR SCORE???** Referee annotate/tally success and penalties, but may not add up points
- ✔ Team members must initial and certify the score sheet
- ✔ **Coaches are not involved in scoring, negotiating with referees, or counting points.**

Online Scoring Tools

https://www.flltournament.com/

- ✔ Teams use this for tallying scores, understanding scoring, planning mission strategies, etc.
- ✔ FLL Competition organizers also use this site to track and post official scores during qualifiers/championships
- ✔ Tip: you can also see a record of posted scores from FLL events around the world!



Tips from Referees

- ✔ Don’t cut it too close. If your robot is 11.999 inches at start, maybe you should rethink your attachment.
- ✔ The Challenge Guide and the Rules Updates document are very important. It’s the same documents the Referees use. Read the rules…and then read the rules again. Remember that anything not mentioned in the rules does not matter. Bring a copy with you to the tournament.
- ✔ The kids are the only ones allowed to talk to the referees (not the coaches). The kids should be ready to discuss their strategy or score with the referees based on the rules, not based on assumptions.
- ✔ The kids should be making decisions and running their robot as they need to. Coaches should be prepared to stand back and let the kids do the work at the competition table. Your job is to cheer for them.

Tips from Referees

- ✔ Build the models exactly as shown in the building instructions and double check the builds. Many teams come to the tournament and find their solution is not working the same as at home. Often, this is because they had an error in their builds.

- ✔ Conditions differ. Each table will be a bit different, mats can get a bit curled, lighting can be different, etc. Make your robot solutions robust. Before coming to the competition, let your robot drive on another team's table. Invite them to yours.

Tips from Referees

- ✔ Many people find it hard to work well under pressure, and where do you feel more pressure than when running your robot at a FIRST LEGO League competition. What can you do? Practice, practice, practice. Stop building and programming your robot at least a week before the competition, and use the time to practice getting your robot to succeed reliably at what it already can do.

- ✔ Don't touch the mission models on the competition table. If you think something is wrong with the way they are set up, you should ask the Referee to adjust them. You can ask the Referee to test the mechanism of any mission model too.

- ✔ Whenever you have a question that you can't answer by reading the rules or if you have any unsusual strategy you wish to discuss ahead of time, contact the Maryland Head Ref: mdfllheadref@gmail.com.

Tips from Referees

- ✔ Don’t request adjustments to the angle/direction of a mission model unless it is specifically stated in the Challenge Document/Field Set Up Guide. The table will not be customized/optimized for your team’s solution.

- ✔ Don’t assume that the Referee will grab the robot when it is stuck or remove something from the field by hand (if allowed). The kids should talk to the Referee ahead of time and let them know that you would like them to help with this since your team members cannot reach the robot or model quickly.

- ✔ HAVE FUN!!!!