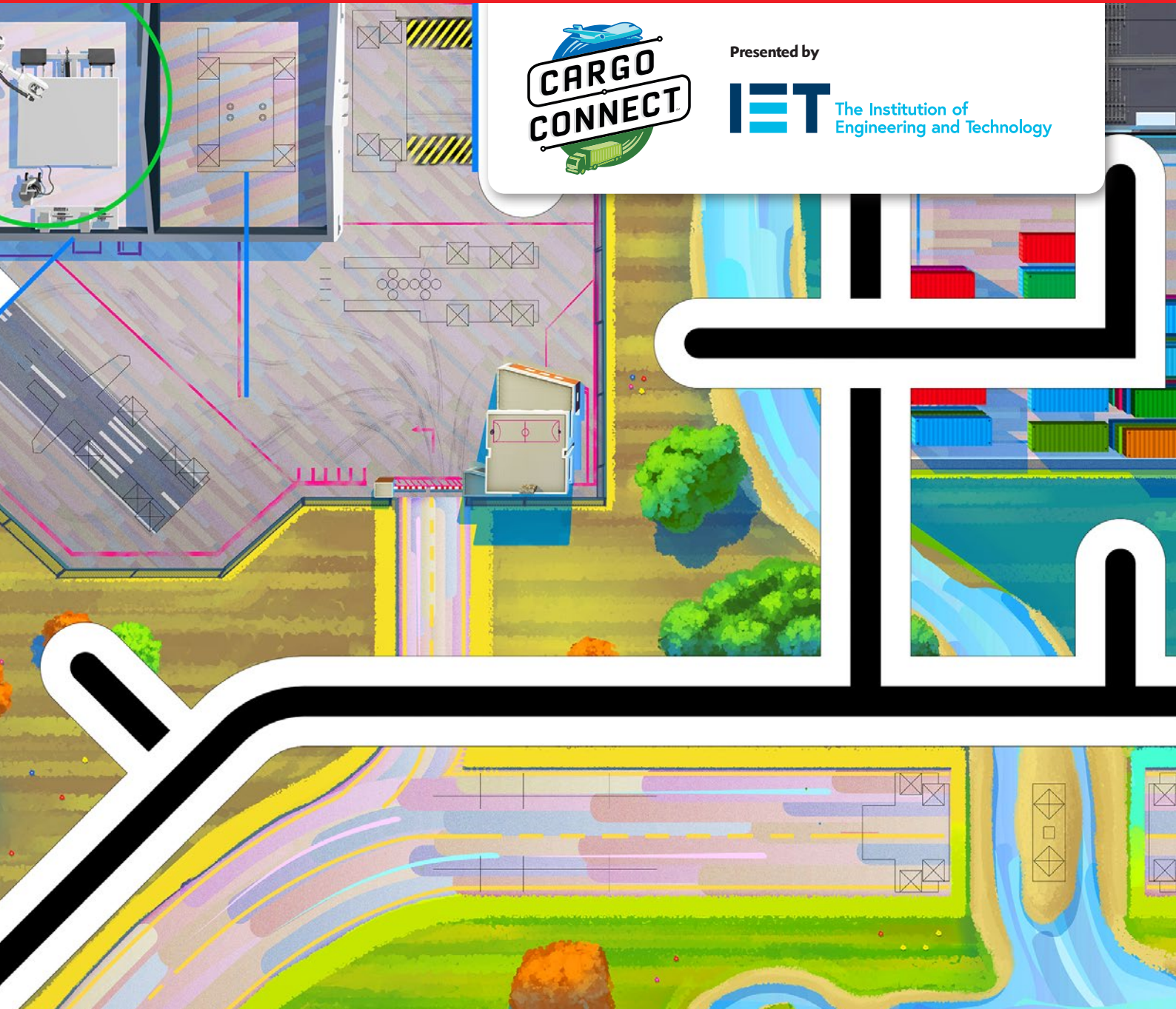




# ROBOT GAME RULEBOOK



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# Robot Game

The *FIRST*® LEGO® League Challenge team works together to design and build a LEGO® robot and then program it to autonomously complete a series of missions to score points in a 2.5-minute robot game. After deciding on their mission strategy, the team launches their robot from the launch area, and it moves around the field attempting to complete the missions.

The robot is programmed to return to home at any time, so the team can modify it before launching again to try other missions. If needed, the robot can be brought back to home by hand, but the team will lose a precision token. The team will have three robot game matches, but only their highest score will count.

This year's CARGO CONNECT<sup>SM</sup> challenge is for the robot to deliver cargo to different forms of transportation or target locations around the field. The robot must activate mission models that represent transportation safety, efficiency, connections, and access.

*Gracious Professionalism*® is how we express our Core Values in *FIRST* LEGO League. The robot game is an important place to observe *Gracious Professionalism*, and therefore our referees will evaluate it for each team at each match.

## The Field

M15

Platooning trucks, Train, Cargo Ship's West Deck.

M16

All circles



Home

Launch area



# Mission Model Building Information



Scan QR code to go to the building instructions.

Bag Number	Bag Contents	Mission Number	Mission Name
<b>EFFICIENCY MODELS – Build in Session 1</b>			
1	2x platooning trucks	<b>M13</b> / <b>M15</b>	Platooning Trucks Load Cargo
2	Switch engine	<b>M05</b>	Switch Engine
3	Hinged container Container contents 3x gray containers	<b>M02</b> / <b>M15</b> / <b>M16</b>	Unused Capacity Load Cargo CARGO CONNECT™
4	Doorstep Package	<b>M11</b>	Home Delivery
<b>SAFETY MODELS – Build in Session 2</b>			
5	Chicken statue	<b>M12</b>	Large Delivery
6	Turbine blade Blue holder	<b>M12</b>	Large Delivery
7	Accident avoidance	<b>M06</b>	Accident Avoidance
8	Cargo ship	<b>M07</b> / <b>M15</b>	Unload Cargo Ship Load Cargo
9	Crane with container	<b>M07</b>	Unload Cargo Ship
<b>ACCESS MODELS – Build in Session 3</b>			
10	Train tracks 2x train cars	<b>M09</b> / <b>M15</b>	Train Tracks Load Cargo
11	West bridge with latch East bridge Center support	<b>M14</b>	Bridge
12	Helicopter Food package	<b>M08</b>	Air Drop
<b>CONNECTIONS MODELS – Build in Session 4</b>			
13	Airplane Truck 2x activators	<b>M04</b>	Transportation Journey
14	Cargo plane 1x gray container	<b>M03</b>	Unload Cargo Plane
15	Storage racks 3x containers (lime green, light orange, and blue)	<b>M10</b> ( <b>M15</b> / <b>M16</b> containers only)	Sorting Center
<b>MODEL FOR MISSION 1 (M01) – Build in Session 8</b>			
16	Innovation Project model bricks	<b>M01</b>	Innovation Project Model
<b>OTHER MODELS – No building</b>			
17	6x precision tokens 4x coach pins* 12x season tiles*	<b>M17</b>	Precision Tokens

\*Note: The coach pins and season tiles are NOT used on the field or with any Missions. These are giveaways; use as you wish.



# Field Setup

The field consists of the border walls and everything inside them. The mat, the mission models, and the home area are all part of the field. The mat and LEGO® pieces for building the mission models are in your Challenge set. The building instructions for the mission models can be found at [firstlegoleague.org/season](http://firstlegoleague.org/season).

## MISSION MODEL BUILDING

The robot interacts with mission models on the field for points. The mission models are built in Sessions 1-4 in the *Engineering Notebook*. To build the mission models (models), use the LEGO pieces from your Challenge set and the building instructions from [firstlegoleague.org/season](http://firstlegoleague.org/season). It would take one person about six hours to build all the models. The information on page 4 will help you to sort the bags before building.

Models need to be built perfectly. Almost perfect is not good enough. If you practice with incorrect models, the robot will have problems at competitions. Best practice is for at least two people to check each other as they build.

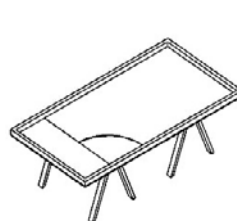
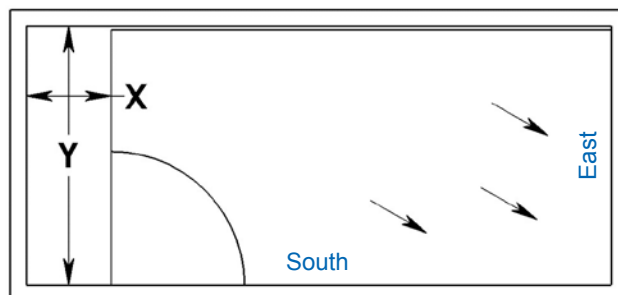
## FIELD MAT PLACEMENT

**STEP 1** – Check the table surface for bumps. Sand or file them away and then vacuum well.

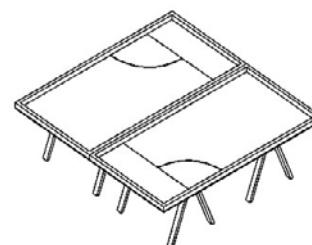
**STEP 2** – On the vacuumed table only, unroll and place the mat as shown on the right. Never fold the mat, and never crush or bend a rolled mat.

**STEP 3** – Slide the mat against the south and east border walls. There should be no gap at the south or east walls, but there should be a gap at the north wall of about 1/4 in. (6 mm). When table size and mat placement are correct, the area west of the mat measures about  $X = 13.5$  in. by  $Y = 45$  in. (343 mm by 1,143 mm).

**STEP 4** – Optional – To hold the mat in place, you can use thin strips of black tape, covering only the mat's east/west black borders.



Practice setup



Tournament setup

**NOTE:** If you compete, remember that volunteers work hard to get the fields just right, but you should expect and design for rare imperfections, like bumps under the mat or changes in light.

Practicing without an official table or border walls is okay, but competitions will be held on an official table in tournament setup. Please practice with this in mind. Guidance for practicing at home and instructions for building an official table can be found here: [firstlegoleague.org/season](http://firstlegoleague.org/season).



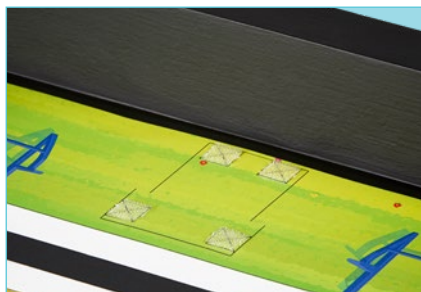
## 3M™ Dual Lock™ Reclosable Fastener



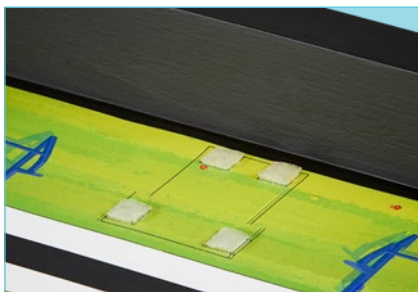
You will find sheets of Dual Lock squares in your Challenge set to secure the models to the mat. Dual Lock is an important part of field setup because if the models are not secured properly, you will have difficulty completing missions.

**SECURING MODELS** – The squares on the mat with the X

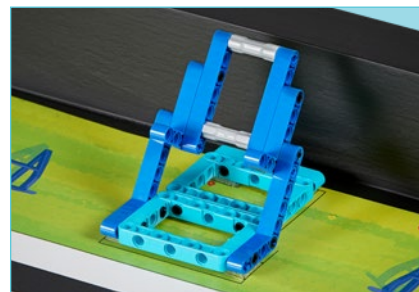
inside show where to apply the Dual Lock. Use the Dual Lock as shown in this example and be very exact. When pressing down a model, press on its lowest solid base instead of pressing from higher up, which might crush the model. To remove the model from the mat, lift it from its base to separate the Dual Lock.



**Step 1:** First Dual Lock square sticky side down



**Step 2:** Second Dual Lock square sticky side up

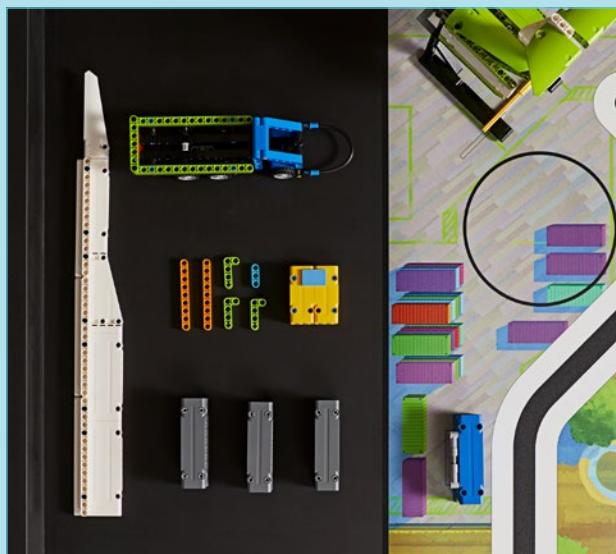


**Step 3:** Align the model and press down

## Mission Model Setup

### Models on Mat Without Dual Lock

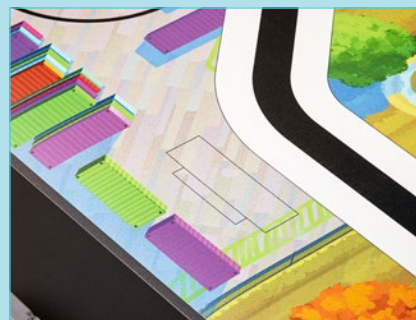
#### Home



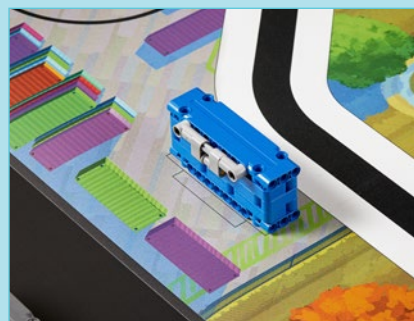
Place the following models in home:

- 1 turbine blade
- 1 platooning truck
- 6 container contents
- 1 package
- 3 gray containers

#### M02 Unused Capacity

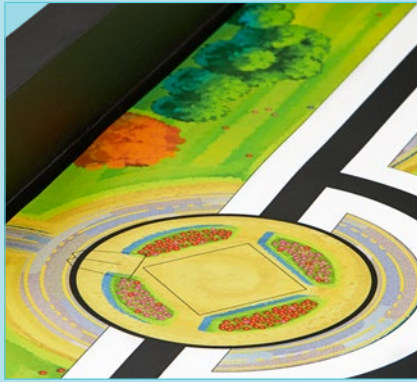


Hinged Container



Closed lid

## M12 Large Delivery



Chicken Statue



## M13 Platooning Trucks

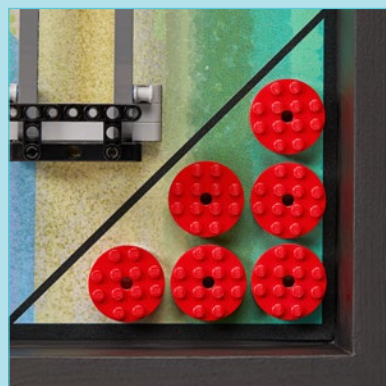


1 Platooning truck



Place facing east on the parallel lines with the center of each wheel on a crossline.

## M17 Precision Tokens





# Mission Models Secured With Dual Lock

## M03 Unload Cargo Plane



Load container in plane and then push cargo door all the way up.

## M05 Switch Engine



Push the yellow bar all the way down/north.

## M06 Accident Avoidance



Black frame and yellow panel are both up/vertical.

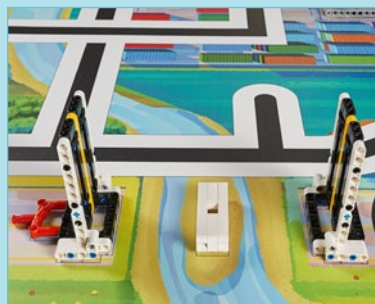
## M11 Home Delivery



## M12 Large Delivery



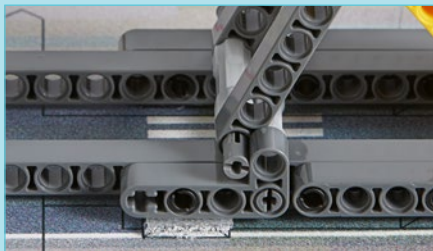
## M14 Bridge



Position as shown with the bridge decks up.

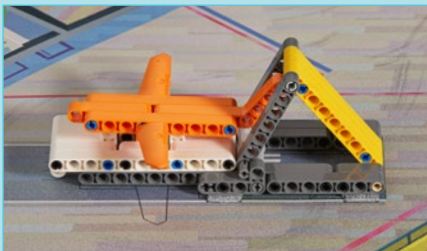
## M04 Transportation Journey

Push bar & Stopper

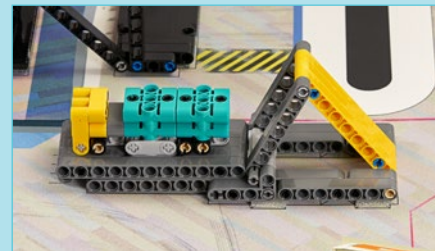


Set each push bar down and back against its stopper.

Airplane



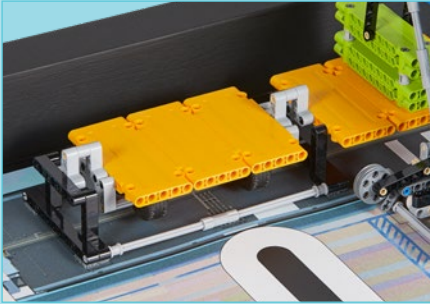
Truck



Set the push bar and place the airplane and truck loose in their activators. Push them backward against their push bars as shown.

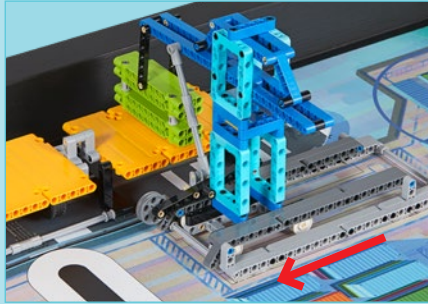
## M07 Unload Cargo Ship

Ship's West Desk

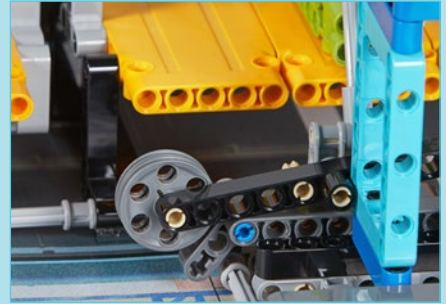


Be sure the ship's west desk swings smoothly.

Crane with Container



Be sure the crane rolls smoothly. Slide the crane all the way west.

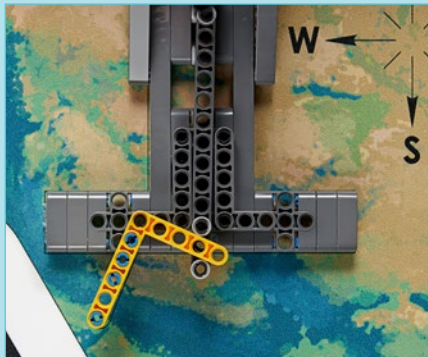


## M08 Air Drop

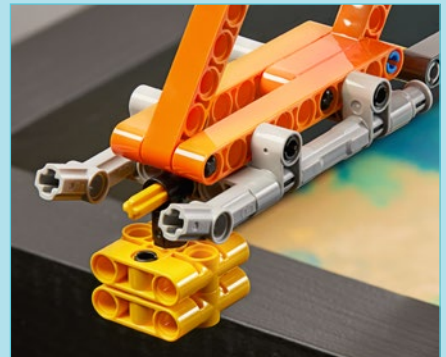
Helicopter



Yellow Lever



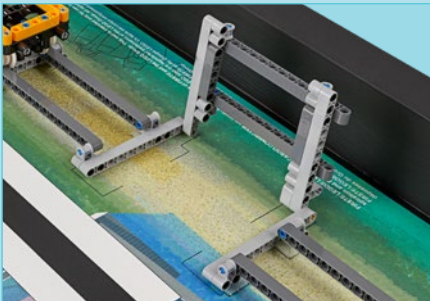
Food Package



Move the yellow lever all the way west, and load the food package onto the front of the helicopter.

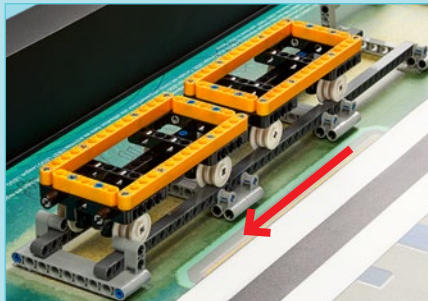
## M09 Train Tracks

Repaired Section



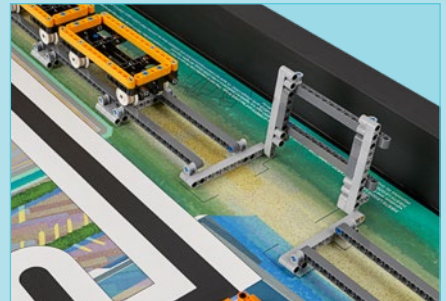
Secure track with repaired section down. Test this section moves freely and then lift the repaired section up.

Train



Place train on tracks all the way north and be sure it rolls smoothly.

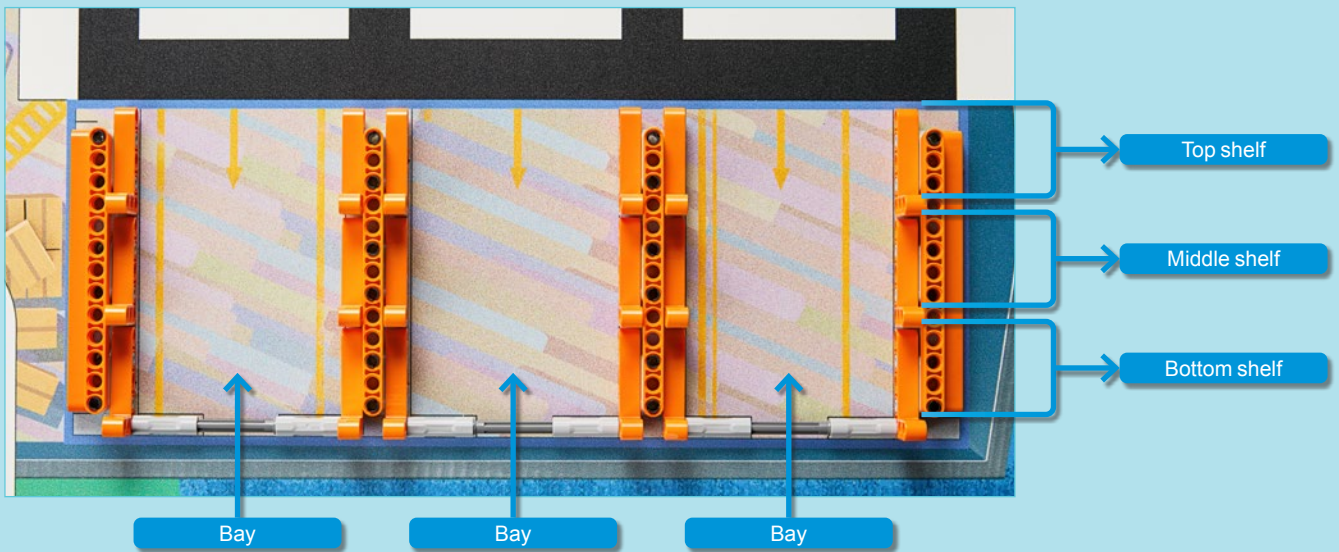
Train & Tracks



The train tracks and train are ready.



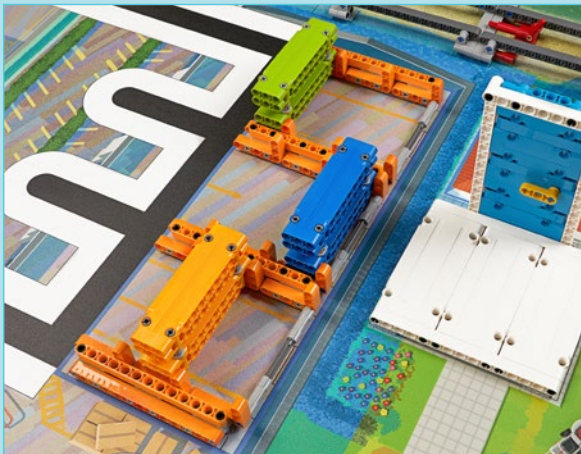
## M10 Sorting Center



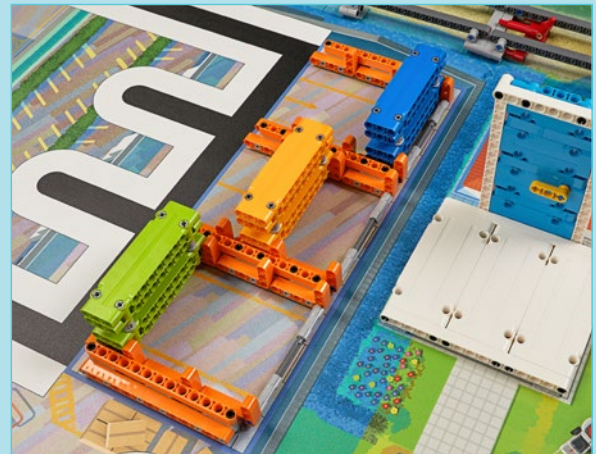
Secure the storage racks with Dual Lock and then place the blue, light orange, and lime green containers as follows:

- Each bay should have one container in it.
- Start by placing the blue container on the bottom shelf in any of the three bays (randomly).
- Next, place the light orange container on the middle shelf in one of the remaining two bays (randomly).
- Lastly, place the lime green container on the top shelf in the last remaining bay.
- Make sure each container is pushed completely south against the storage rack shelf for alignment.
- Each time you set up your field, try a new configuration (there are six configurations total).

Random placement example



Random placement example





# Missions

Missions are tasks that can be completed for points. The details are simple, but there are many of them. For full understanding, read and reread them as a team, next to an actual field.

Below, example mission MXX tells you what each part of a mission's text is for, based on its location and color.

## MXM Example Layout

*Model Picture*

*Field Location*

Information about each mission

Not used for scoring

- Regular black text under the mission description lists the main requirements: **XX points are in bold red.**
- If the referee sees these things performed or completed: **XX points as described.**

*Blue italic text is for very important added requirements, leniency, or other helpful facts.*

*Sometimes, pictures teach you with an example score.*

**XX points are in bold red.**

*Sometimes, a picture has a description to help explain it.*

**XX points are in bold red.**

*The pictures may not show you all the scoring possibilities, just some examples!*

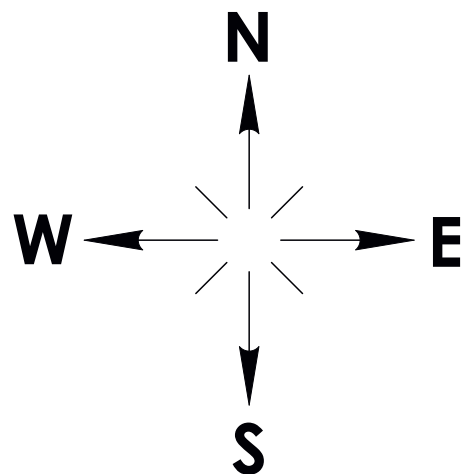
**XX points are in bold red.**

### Mission Model Location and Direction

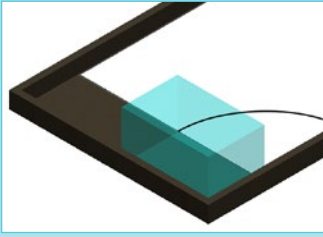
Missions often use coordinates such as north (N), east (E), south (S), and west (W) to describe direction or location.

For example, instead of right or left, we might use east (E) or west (W). Instead of top or bottom, we might use north (N) or south (S). The compass here can be used as a reference to help visualize this.

A compass has been provided on the mat. If you ever get stuck with directions, you can check your mat or come here for reference!



## M00 Equipment Inspection Bonus



Designs using fewer parts can save you time and space, allowing for efficiency and sometimes fewer problems.

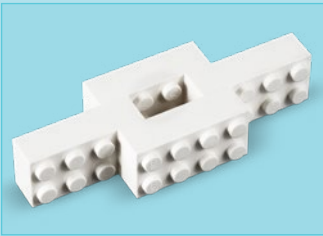
If all your equipment fits in the small inspection area: **20**

*When you get to each match, remove all your equipment from any storage containers and show the referee you can fit it all in the inspection area. See **R09** for details.*

Small Inspection Area



## M01 Innovation Project Model



Example only

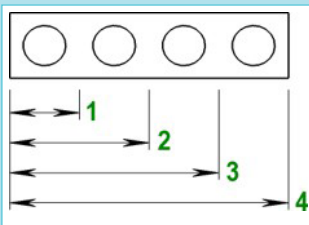


Identifying problems and creating or improving solutions are all very important when it comes to transportation. As the world changes, engineers, programmers, and builders continue to explore and solve the challenges we face, making life easier, safer, and better for everyone.

If your Innovation Project Model has the following: **20**

- Made of at least two white LEGO® pieces.
- Measures at least as long as 4 LEGO “studs” in some direction.
- Has any part of it touching the CARGO CONNECT™ circle.

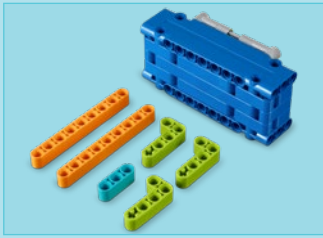
*Design and bring a single Innovation Project Model of your own to the match.*



20



## M02 Unused Capacity

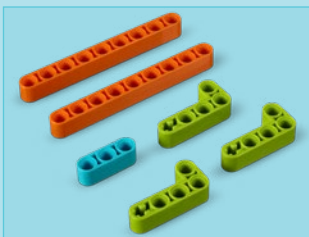


Shipping efficiency increases by filling the empty container with cargo before transporting it.

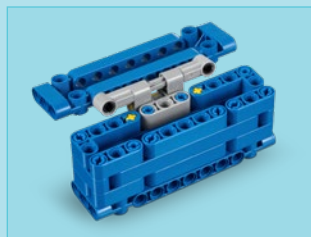
- If the hinged container is completely closed: . . . . . **Partly full of contents: 20**  
**Completely full of contents: 30**

*“Partly full” requires 1-5 content pieces to be completely inside the closed hinged container.*

*“Completely full” requires all 6 content pieces be completely inside the closed hinged container.*



Container Contents



Opened  
0



Opened  
0



Completely closed

## M03 Unload Cargo Plane



Unloading cargo is an important part of the journey. Planes are often just one of multiple forms of transportation used to deliver cargo containers to their destination.

- If the cargo plane has been prepared for unloading so that the cargo door rests completely down, touching its black frame: **20**
- If the cargo plane has been unloaded so that the container is completely separate from the plane: **10**



0



20



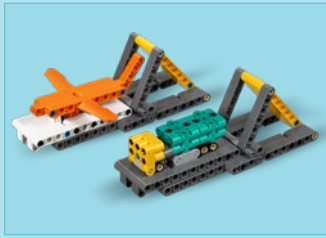
20+10



10



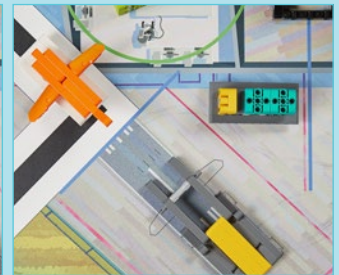
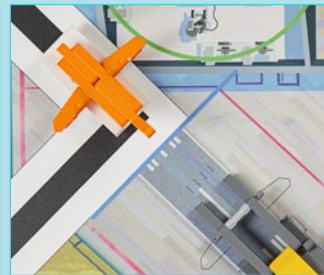
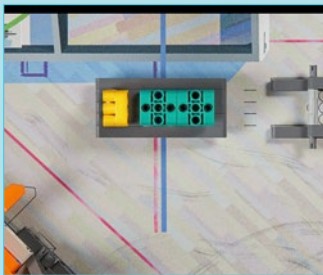
## M04 Transportation Journey



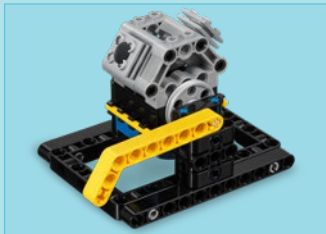
Transporting cargo is a journey from beginning to end. Cargo often needs more than one form of transportation to complete the journey and reach a final destination.

- If the truck has reached its destination, completely past its blue end line, on the mat: **10**
- If the airplane has reached its destination, completely past its blue end line, on the mat: **10**
- Bonus: If both the above are true: **10 added**

*Extend the blue end lines in both directions to the edges of the mat as needed when scoring.*

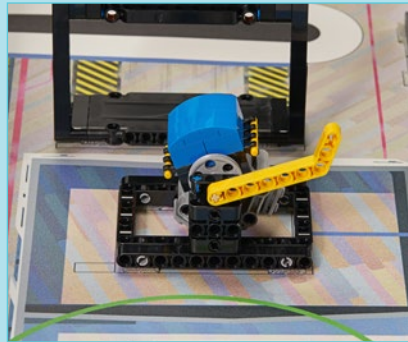


## M05 Switch Engine

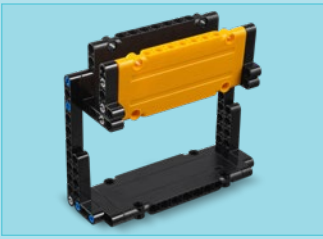


Energy efficiency plays an important role in transportation. Switch your engine from diesel to electric. You will save money while being environmentally friendly.

- If the engine has been switched from diesel to electric so that the yellow bar rests all the way down/south: **20**



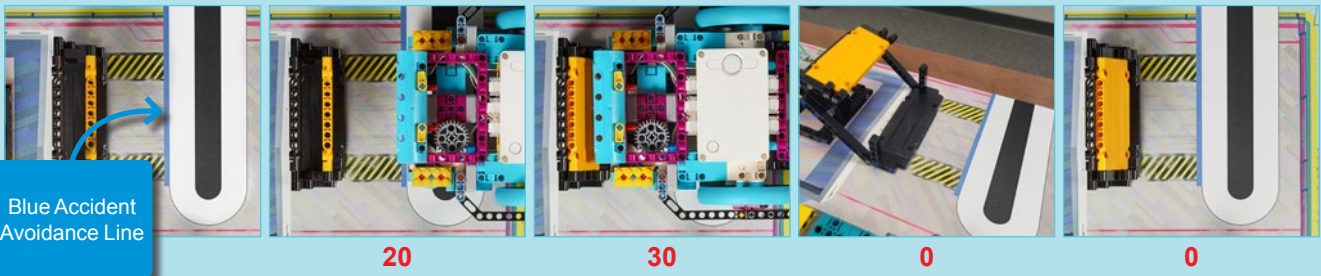
## M06 Accident Avoidance



Accidents can cause many problems when transporting cargo. People could be hurt, cargo and machines could be damaged, or your cargo could be late.

- If your robot is parked over the blue accident-avoidance line at the end of the match and the yellow panel is:
  - Not knocked down: **20**
  - Knocked down: **30**

*If the black frame is knocked down at the end of the match, this mission does not score.*

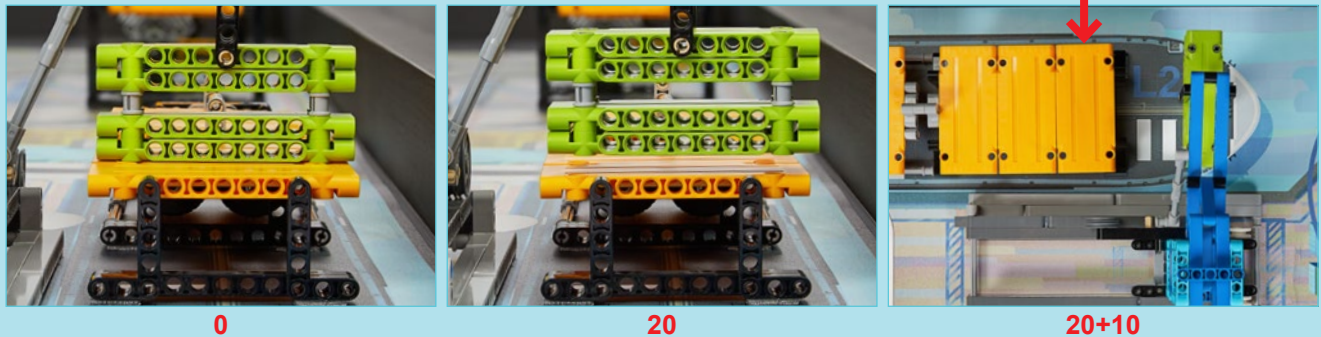


## M07 Unload Cargo Ship



Unloading cargo is an important part of the journey. Ships are often just one of multiple forms of transportation used to deliver cargo containers to their destination.

- If the container is no longer touching the cargo ship's east deck: **20**
- If the container is completely east of the cargo ship's east deck: **10**





## M08 Air Drop



Helicopters can be used to transport cargo to areas that are difficult to reach. They are used to help others, bringing important packages like food.

- If the food package is separated from your helicopter: **20**
- If the food package is separated from the other field's helicopter and is completely in your field's **CARGO CONNECT<sup>SM</sup>** circle: **10**
- If both teams have separated their food packages from their field's helicopters: **10**



20



10



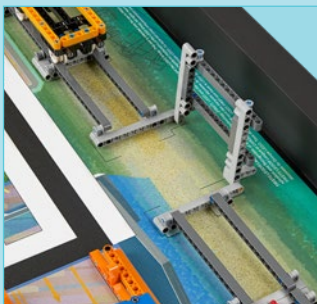
10

## M09 Train Tracks

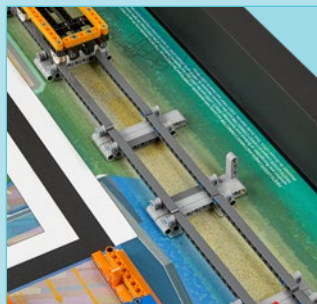


Trains can transport cargo to many places. Keeping infrastructure like train tracks in good condition is important to ensure trains get to their destinations.

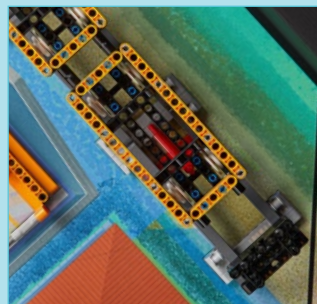
- If the train track is repaired so that it rests completely down/west: **20**
- If the train has reached its destination, latched at the end of the tracks: **20**



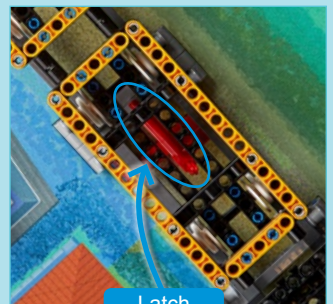
0



20



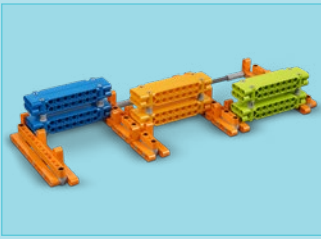
20+20



Latch



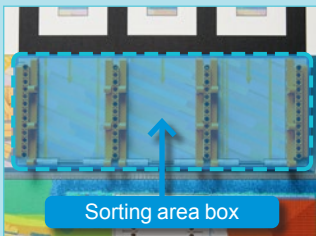
## M10 Sorting Center



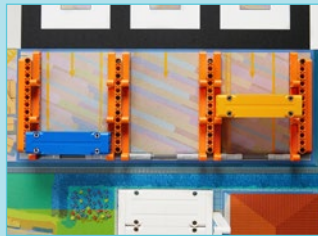
Transportation includes getting the correct cargo to the correct place. Sort your containers and deliver them to their destinations.

- If the containers have been sorted so that the light orange container is the only container remaining completely in the blue sorting area box: **20**

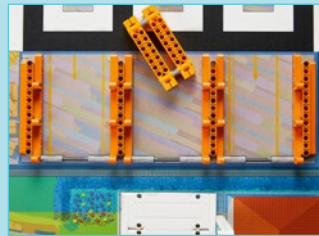
*Tip: These containers may also be used in other missions.*



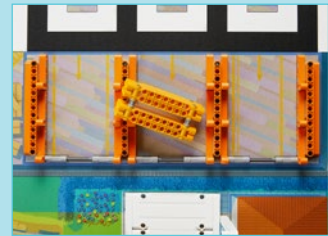
Sorting area box



0



0



20

## M11 Home Delivery



Having a package delivered to your doorstep is awesome! Packages can be transported safely, on time, and to your door.

- If the package has been delivered to its destination so that it is on the doorstep: . . . . . **Partly: 20**  
**Completely: 30**

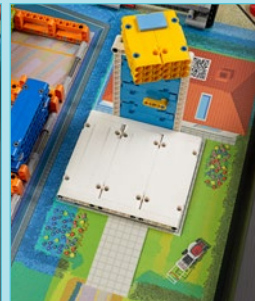
*The package does not score if it is touching any equipment at the end of the match.*



0



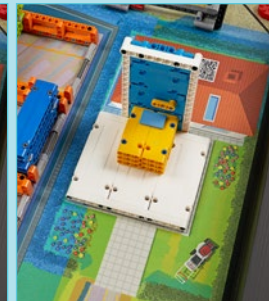
0



0



20

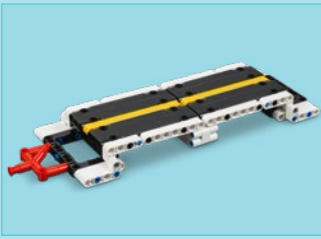


30



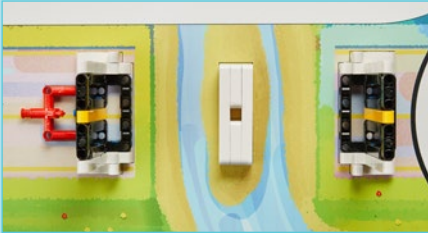


## M14 Bridge

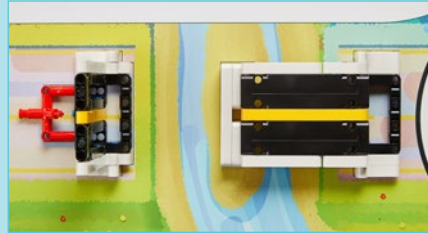


This bridge can be raised and lowered to allow transport on both the river and the road. Lower the bridge decks to prepare for the trucks to pass.

- If the bridge deck(s) have been lowered and rest on their center support: **10 each**



0



10



10+10

## M15 Load Cargo



Load cargo containers safely and efficiently.

- If there are containers on and touching only the:

**Platooning Trucks:** 10 each (Max 20 points)

**Train:** 20 each (Max 40 points)

**Cargo Ship's West Deck:** 30 each (Max 60 points)

*A maximum of two containers can score per form of transportation.*

*Containers can touch each other or have contents.*

*Containers can touch the gray ends of the cargo ship's west deck.*

*Containers on Platooning Trucks must be completely outside of home.*



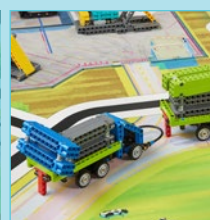
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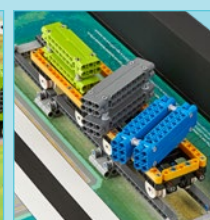
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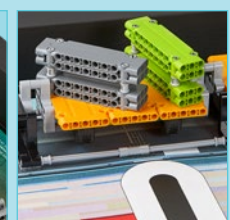
10



10+10



20+20



30+30

Equipment



## M16 CARGO CONNECT<sup>SM</sup>



Connect cargo to all forms of transportation. Make as many connections as you can and transport your cargo by land, sea, or air to its destination!

You earn points for the number of containers delivered to circles, the total number of circles that you delivered containers to, and if you deliver the right container to the right circle.

- If there are containers in any circle: . . . . . **Partly: 5 each**  
**Completely: 10 each**
- If the blue (not hinged) container is completely in the blue circle: . . . . . **20 added**
- If the lime green container is completely in the lime green circle: . . . . . **20 added**
- If there are any circles with at least one container completely in them: . . . . . **10 each circle**

*Containers include gray, light orange, blue (not hinged), lime green, and blue (hinged).*



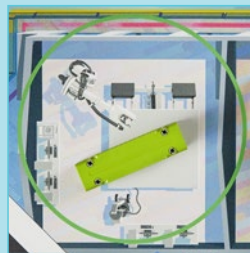
2 Partly: **10**  
3 Completely: **30**  
1 Circle: **10**

**10+30+10**



1 Completely: **10**  
1 Blue: **20**  
1 Circle: **10**

**10+20+10**



1 Completely: **10**  
1 Green: **20**  
1 Circle: **10**

**10+20+10**

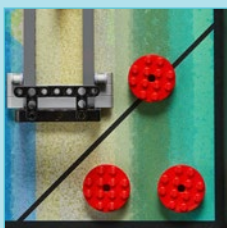


5 Completely: **50**  
1 Blue: **20**  
1 Green: **20**  
5 Circles: **50**  
**50+20+20+50**

## M17 Precision Tokens



The less often you interrupt the robot outside home, the more points you keep.



**25**

- If the number of precision tokens left on the field is:  
**1: 10, 2: 15, 3: 25, 4: 35, 5: 50, 6: 50**

*You can lose one precision token without it affecting your score. Use it strategically and be sure you understand **R5**, **R12**, **R15**, **R16**, and **R19**.*

## Gracious Professionalism® displayed at the robot game table

Referees will evaluate *Gracious Professionalism*® for every team at each one of their matches.

The *Gracious Professionalism* points will be added to the points scored on the Core Values rubric during the judging session and will make up a portion of the total Core Values score.

It will be assumed that every team will start with

*Gracious Professionalism* that is **ACCOMPLISHED** (3 points). If a referee observes behavior that is above and beyond what is expected, they will score the team's *Gracious Professionalism* as **EXCEEDS** (4 points). Equally, if a team's behavior shows that their *Gracious Professionalism* is still evolving, they will be scored as **DEVELOPING** (2 points).

DEVELOPING	ACCOMPLISHED	EXCEEDS
2	3	4

## Rules

Be sure to read the rules carefully! We highly encourage teams to stand next to an actual field for reference. Your understanding of the rules can greatly affect your performance and overall score in a match.

Throughout the season, a rule or mission may receive an update. Make sure you read these carefully and check back often. Challenge Updates can be found at [firstlegoleague.org/season](http://firstlegoleague.org/season).

### RXX Example Layout

*Purple text introduces or summarizes rule context for faster understanding where helpful. It is not used for scoring.*

**Black** text under purple is for the main facts of the rule.

*Blue text under black is for very important added tips, leniency, or other helpful facts.*

# PREPARATION | DEFINITIONS AND RULES

## R01 EQUIPMENT

*R01 tells you what the robot and its accessories can be made from.*

Anything you bring to a match for mission-related activity. This includes your robot, attachments, strategic accessories, and Innovation Project.

- All equipment needs to be LEGO® made, in original factory condition.
  - **Exception 1:** LEGO string and tubing can be cut to length.
  - **Exception 2:** You can put identification marks in hidden areas.
- Factory-made wind-up/pull-back motors are not allowed.
- Additional/duplicate mission models are not allowed.
- Nonelectric LEGO pieces are allowed from any set. You may use as many as you like.
- Use only building pieces – not packaging, clothing, and so on.
- Stickers are allowed only as originally shown in LEGO building instructions.
- One sheet of notebook paper is okay for program notes only and does not count as equipment.
- Electric LEGO equipment is allowed only as described and shown here (LEGO Education SPIKE™ Prime and MINDSTORMS® EV3 shown, but MINDSTORMS Robot Inventor and equivalent NXT and RCX are also allowed).
- You can also use LEGO wires, one controller's power pack or six AA batteries, and one microSD card.

### Controller:

Maximum of one in any one match.  
No more than one can be brought to the field.

### Motors:

Any mix, maximum of four in any one match. No more than four can be brought to the field.

### Sensors:

Only touch/force, color, distance/ultrasonic, and gyro sensors are allowed in any mix and any number.



*SPIKE Prime*



*MINDSTORMS EV3*



## R02 SOFTWARE AND CONTROL

---

- Use any software that allows the robot to move autonomously (on its own), run only by programs that are loaded onto the controller or microSD card.
- Remote control is not allowed in the competition area. Turn Bluetooth off or disable all connections.

## R03 ROBOT

---

*R03 defines the robot by what is added or removed from it at the moment.*

Your controller and any equipment currently combined with the controller by hand and intended not to separate from it, unless by hand.

*Example 1: A removable forklift attachment counts as part of the robot, but only while it is attached.*

*Example 2: A weight the robot is carrying out to drop on something is not part of the robot. That is cargo.*

## R04 MISSION MODEL

---

*R04 defines and limits what you can do with the game objects on the field that are not your equipment.*

Any LEGO® object already on the field when you get there.

- You cannot take mission models apart, even temporarily.
- If you combine a model with anything (including the robot), the combination needs to be loose or simple enough that, if asked to, you could free the model in perfect original condition immediately.
- All parts of a model count as the model. Examples: frames, bases, and loops.

## R05 PRECISION TOKENS

---

The six red disc models. They are worth free points when the match starts but can be removed by the referee one at a time until they are gone. See rules **R15**, **R16**, and **R19**.

## R06 MISSION

---

One or more tasks that can be completed for points. Try them in any order you like.

## R07 MATCH

---

When two teams play opposite each other on two fields joined north to north. For 2.5 minutes, the robot launches, returns, and repeats, trying as many missions as possible.

## R08 TECHNICIANS

The team members handling the robot during the match.

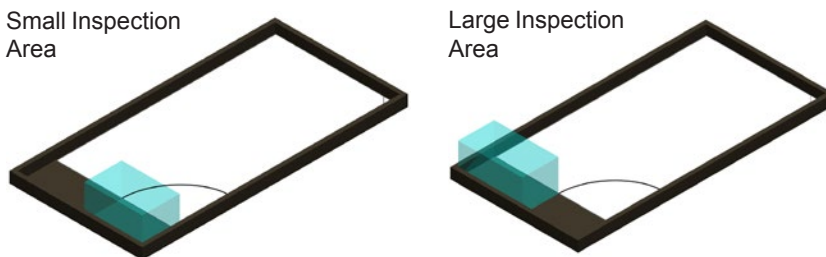
- Only two technicians are allowed at the field at once.
- Substitute technicians can switch with current technicians at any time.
- Other team members must stand back as guided by competition officials.

## R09 EQUIPMENT INSPECTION

*R09 tells you about equipment volume limits, when and how they are checked, and what happens if you pass or not.*

When you get to each match, remove all your equipment from any containers and show the referee you can fit it all completely into one of two (imaginary) inspection areas shown below. You can use your hands to help equipment fit in the inspection area. The spaces each have an imaginary ceiling 12.0 in. (305 mm) high.

- If it fits in the large area, you pass. If it fits in the small area, you pass and get a mission point bonus. See **M00**.
- If it does not fit in the large area, break the excess down or send it to the pit area.
- After inspection, the inspection area and 12.0 in. (305 mm) high ceiling no longer exists. Spread things out in home as you like.



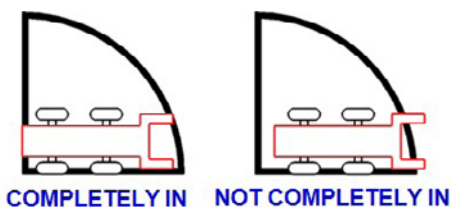
*The blue spaces shown above are imaginary, each having a ceiling 12.0 in. (305 mm) high.*

## R10 COMPLETELY IN

100% contained in the airspace above the area and under the ceiling height if one is given.

- 100% includes every bit of something – not just the parts that touch the mat.
- Drawn lines that form an area are part of that area.

These examples shown are the launch area, from above:



## R11 FIELD CHECKS

*R11 helps prevent problems with optic sensor readings and mission model failure.*

Between inspection and the first launch only, you can calibrate sensors anywhere you like, and you can ask the referee to check any field setups you are concerned about.

## R12 HOME

*R12 defines where the robot goes between missions and tells what other handling is or is not allowed.*

The (imaginary) space labeled “Home” in **R13**.

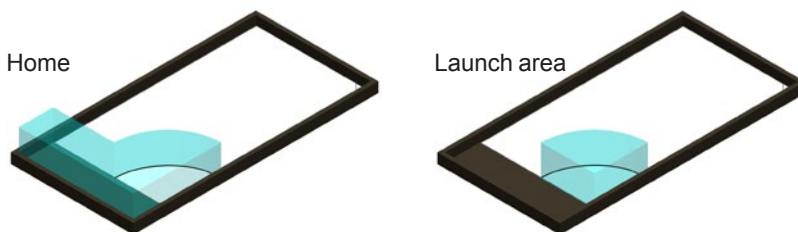
- Home is part of the field.
- Home has no ceiling.
- Home is your space for handling and storing allowable things whenever you like.
- It is also the place for handling and preparing the robot before and between launches.
- After any launch, the robot needs to return completely into home if you want to handle it without losing a precision token.
- The robot can leave home only from the launch area, but it can return to any part of home.
- Do not interact with things outside home except by rules **R15** and **R19**. Anything the robot affects or moves completely outside home stays as is unless the robot changes it (see rule **R19**).
  - **Exception 1:** If something comes out of home by accident, grab it quickly so it does not upset the field.
  - **Exception 2:** If equipment breaks off the robot unintentionally, you can pick it up as needed.
- You cannot strategically send or extend anything even partly out of home except by launching the robot.

## R13 LAUNCH AREA

*R13 defines what area of home the robot launches from and gives limits for that area during launches.*

The (imaginary) space labeled “Launch area” below. It has no ceiling. The launch area is a part of home with a special purpose – but only when launching.

- For every launch, the robot and anything it is about to move needs to fit completely in the launch area.
- Right after and between launches, the launch area is a regular part of home.



*The blue spaces shown above are imaginary and have no ceiling.*





# ACTION | DEFINITIONS AND RULES

## R14 LAUNCHING

---

*R14 gives the conditions required for launch and then gives the launch procedure.*

To launch, show the referee Checks 1 and 2 and then press a button, signal a sensor, or allow a timer to get the motors spinning.

- Check 1: The robot and everything it is about to move fits completely in the launch area.
- Check 2: You are not holding anything from moving, including motor torque or stored energy.
- Match start: The earliest time for the first launch of the match is precisely at the beginning of the last word or sound in the countdown, such as “3, 2, 1... LEGO!” All other launches can happen as soon as you show the referee Checks 1 and 2.

## R15 INTERRUPTION

---

*R15 defines and limits the action of you touching the robot after it is launched.*

When you interact with a launched robot or any object touching it.

- You can interrupt the robot any time for any reason, but be sure to study rules **R16** and **R19**.
- The best time and place to interrupt the robot is when it is completely in home (**R12**).
- Do not use the exact “perfect timing” of an interruption (your eyes doing the work of a timer or sensor) as a strategy to produce a new scoring result or advantage. Missions benefiting will score zero.
- Do not send or drop things to hit or land on the robot.

*If the robot returns home and you do not interrupt it, it is free to interact with things you might have placed there for it, and it is free to leave from anywhere in home without a launch.*

## R16 INTERRUPTION PROCEDURE

---

*R16 gives the procedure and consequences for interrupting the robot, depending on where it was at the time.*

To interrupt the robot, stop it and carry it home if it is not there.

- If it was completely in home: No problem.
- If it was not completely in home: Lose a precision token.

*Mislaunch exception: If you interrupt the robot so soon after launch that it has just barely reached the launch area arc line, you need to relaunch, but you will not lose a precision token.*

*Motor-saving exception: If the robot is stuck outside home straining its motors and you do not intend to launch again, you can shut it down and leave it in place without losing a precision token.*

*End-of-match exception: Stopping the robot at the end of the match is okay. If you follow **R15**, Bullet 3, you will not lose a precision token. Leave the robot in place as in **R22**.*

## **R17 CARGO**

---

*R17 defines when things are under the robot's strategic control.*

While something is purposefully/strategically being captured, kept, moved, or released, it counts as cargo. When the robot is clearly no longer touching whatever thing it was controlling, that thing is no longer considered cargo.

## **R18 INTERRUPTION WITH CARGO**

---

*R18 gives the consequences for interrupting the robot with cargo, depending on where the cargo was at the time.*

For cargo completely or partly outside home during an interruption: If the robot had it when launched, you can keep it. If not, the referee takes it.

## **R19 STRANDED CARGO**

---

*R19 gives the consequences for the robot abandoning cargo, depending on where the cargo comes to rest.*

If former cargo is stranded outside home. If it is completely outside, it stays as is. If it is partly outside, you must take it into home and lose a precision token.

- The cargo needs to come to rest before this can be decided.
- If stranded cargo being taken into home by hand includes a mission model, the referee takes the mission model.

## **R20 INTERFERENCE**

---

*R20 gives the consequences for upsetting the opposing team, field, or robot.*

A robot cannot interfere with the opposing field or robot unless there is a mission exception. Points failed or lost due to interference score automatically. Collaboration is okay.

## **R21 FIELD DAMAGE**

---

*R21 gives the consequences for harm to your own field.*

If the robot separates 3M™ Dual Lock™ Reclosable Fastener or breaks a mission model, the field stays as is, and missions clearly made possible or easier score zero.

# SCORING | DEFINITIONS AND RULES

## R22 END-OF-MATCH SCORING

---

*R22 cautions you that if the robot's accomplishments are wrecked before the match ends, they will not score.*

Mission requirements must be visible at the end of the match to count unless a method is required.

- Precisely as the match ends, everything needs to freeze in place for examination.
- Stop the robot, leave it as is, and then keep hands off everything as the referee scores the field with you.

## R23 DIRECT WORDING

---

*R23 limits confusion and cautions you against reading requirements that are not there.*

Robot Game text means exactly and only what it says.

- If a word is not defined in the detailed game text, use its common conversational meaning.
- If a detail is not mentioned, it does not matter.

## R24 INFORMATION RANKING

---

*R24 pre-answers the question "what if two game facts disagree?"*

Among all Robot Game information sources, the most recent Robot Game updates have highest authority, followed by the missions, the competition rules, and then the field setup.

- Within any one information source, text has authority over pictures.
- Videos, emails, and forum posts have no authority.

You can find Challenge Updates at [firstlegoleague.org/season](http://firstlegoleague.org/season).

## R25 BENEFIT OF THE DOUBT

---

*R25 tells the referee how to rule in confusing or hard-to-tell situations.*

If the referee's decision could go either way or if the referee's preparation, attention, vision, or memory cause an issue, you get the benefit of the doubt.

## R26 FINAL RESULTS

---

*R26 tells you how scores become official, including tie scores.*

Once you agree with the score, it becomes official.

- If needed, the head referee makes final decisions.
- Only your best score from ranked matches counts toward awards/advancement. Ties are broken using second- and third-best scores as needed. If it's still not settled, competition officials decide what to do.
- Playoffs, if held, are just for extra fun.



## NEW THIS YEAR

**Caution to returning teams: The following list is not detailed. You still need to read the full competition rules carefully and often.**

- *Gracious Professionalism*® will now be evaluated for every team at every match. See page 21. The points awarded will make up a proportion of the team's Core Values score.
- Rules that were edited: **R01**, **R02**, **R06**, **R08**, **R09**, **R12**, **R16**.

- Highlights:
  - Mission definition more clearly allows for the use of equipment by the robot to complete missions. See **R06**.
  - Home definition and robot returning procedure have been clarified. See **R12**.
  - The end of match interruption exception has been clarified. See **R16**.
  - The point values for **M00** Equipment Inspection Bonus and **M17** Precision Tokens have changed. The blue text in **M17** gives advice if you want to take advantage of the change.
- Throughout the season, a rule or mission may receive an update. Make sure you read these carefully and check back often. Challenge Updates can be found at [firstlegoleague.org/season](http://firstlegoleague.org/season).

**GOOD LUCK and  
have FUN!**

**Keep testing and improving your robot  
and your programs on the playing field.**

**Practice, practice, practice is the best  
way to prepare for your  
tournament!**





Team #	Match:	Referee:	Table:
--------	--------	----------	--------

TEAM INITIALS:

			SCORE
<b>M00</b>	<b>EQUIPMENT INSPECTION BONUS</b>		
If all your equipment fits in the small inspection area:		<b>20</b>	
<b>M01</b>	<b>INNOVATION PROJECT MODEL</b>		
If your Innovation Project Model has the following:		<b>20</b>	
<ul style="list-style-type: none"> <li>Made of at least two white LEGO® pieces.</li> <li>Measures at least as long as 4 LEGO “studs” in some direction.</li> <li>Has any part of it touching the CARGO CONNECT<sup>SM</sup> circle.</li> </ul>			
<b>M02</b>	<b>UNUSED CAPACITY</b>		
If the hinged container is completely closed:		<b>20</b>	
<ul style="list-style-type: none"> <li>Partly full of contents (<i>1-5 content pieces</i>):</li> <li>Completely full of contents (<i>All 6 content pieces</i>):</li> </ul>		<b>30</b>	
<b>M03</b>	<b>UNLOAD CARGO PLANE</b>		
If the cargo plane has been prepared for unloading so that the cargo door rests completely down, touching its black frame:		<b>20</b>	
If the cargo plane has been unloaded so that the container is completely separate from the plane:		<b>10</b>	
<b>M04</b>	<b>TRANSPORTATION JOURNEY</b>		
If the truck has reached its destination, completely past its blue end line, on the mat:		<b>10</b>	
If the airplane has reached its destination, completely past its blue end line, on the mat:		<b>10</b>	
Bonus: If both the above are true:		<b>10 Added</b>	
<b>M05</b>	<b>SWITCH ENGINE</b>		
If the engine has been switched from diesel to electric so that the yellow bar rests all the way down/south:		<b>20</b>	
<b>M06</b>	<b>ACCIDENT AVOIDANCE</b>		
If your robot is parked over the blue accident-avoidance line at the end of the match and the yellow panel is:		<b>20</b>	
<ul style="list-style-type: none"> <li>Not knocked down:</li> <li>Knocked down:</li> </ul>		<b>30</b>	
<i>If the black frame is knocked down at the end of the match, this mission does not score.</i>			
<b>M07</b>	<b>UNLOAD CARGO SHIP</b>		
If the container is no longer touching the cargo ship’s east deck:		<b>20</b>	
If the container is completely east of the cargo ship’s east deck:		<b>10</b>	
<b>M08</b>	<b>AIR DROP</b>		
If the food package is separated from your helicopter:		<b>20</b>	
If the food package is separated from the other field’s helicopter and is completely in your field’s CARGO CONNECT <sup>SM</sup> circle:		<b>10</b>	
If both teams have separated their food packages from their field’s helicopters:		<b>10</b>	
<b>M09</b>	<b>TRAIN TRACKS</b>		
If the train track is repaired so that it rests completely down/west:		<b>20</b>	
If the train has reached its destination, latched at the end of the tracks:		<b>20</b>	

<b>M10</b>	<b>SORTING CENTER</b>	
If the containers have been sorted so that the light orange container is the only container remaining completely in the blue sorting area box:		<b>20</b>

<b>M11</b>	<b>HOME DELIVERY</b>	
If the package has been delivered to its destination so that it is on the doorstep:		• Partly: <b>20</b> • Completely: <b>30</b>
<i>The package does not score if it is touching any equipment at the end of the match.</i>		

<b>M12</b>	<b>LARGE DELIVERY</b>	
If the turbine blade is touching only the blue holder and:		• The mat: <b>20</b> • Nothing else: <b>30</b>
If the chicken statue is upright with its base in its circle:		• Partly: <b>5</b> • Completely: <b>10</b>

<b>M13</b>	<b>PLATOONING TRUCKS</b>	
If both trucks are latched together completely outside of home:		<b>10</b>
If a truck is latched to the bridge:		<b>10</b>
Bonus: If both of the above are true:		<b>10 Added</b>

<b>M14</b>	<b>BRIDGE</b>	
If the bridge deck(s) have been lowered and rest on their center support:		<b>10 Each</b>

<b>M15</b>	<b>LOAD CARGO</b>	
If there are containers on and touching only the:		• Platooning Trucks: <b>10 each (Max 20 points)</b> • Train: <b>20 each (Max 40 points)</b> • Cargo Ship's West Deck: <b>30 each (Max 60 points)</b>
<i>Containers on Platooning Trucks must be completely outside of home</i>		

<b>M16</b>	<b>CARGO CONNECT<sup>SM</sup></b>	
If there are containers in any circle:		• Partly: <b>5 each</b> • Completely: <b>10 each</b> • If the blue (not hinged) container is completely in the blue circle: <b>20 added</b> • If the lime green container is completely in the lime green circle: <b>20 added</b> • If there are any circles with at least one container completely in them: <b>10 each circle</b>

<b>M17</b>	<b>PRECISION TOKENS</b>	
If the number of precision tokens left on the field is:		
<b>1: 10</b>	<b>2: 15</b>	<b>3: 25</b>
<b>4: 35</b>	<b>5: 50</b>	<b>6: 50</b>

<b>FINAL SCORE</b>	
<i>(FINAL SCORE = SUM OF ALL VALUES IN THE "SCORE" COLUMNS)</i>	

<b>RETURN LOOSE ITEMS</b>
1 Turbine Blade, 2 Platooning Trucks, 6 Container Contents, 1 Package, Containers – 4 Gray, 1 Lime Green, 1 Blue, 1 Light Orange & 1 Hinged, 1 Airplane, 1 Truck, 1 Train, 1 Food Package, 6 Precision Tokens, & 1 Chicken Statue

<b>Gracious Professionalism<sup>®</sup> displayed at the robot game table:</b>		
<b>DEVELOPING</b>	<b>ACCOMPLISHED</b>	<b>EXCEEDS</b>
<b>2</b>	<b>3</b>	<b>4</b>



# Robot Path Diagram

