



FIRST LEGO LEAGUE CHALLENGE

Mission Brainstorming Worksheets



TEAM NAME:

TEAM NUMBER:

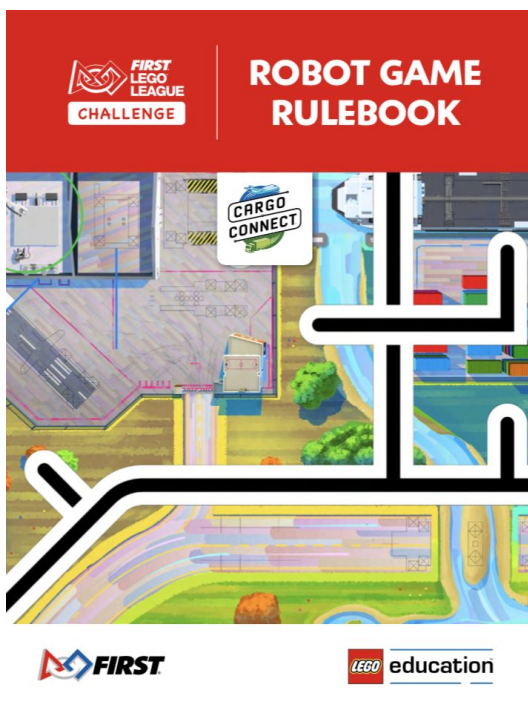
Updated: August 2021

Instructions

This document is ***NOT*** a substitute for reading the Robot Game Rulebook (RGR). The main purpose of this document is to brainstorm mechanisms and methods for solving missions. We assume that every student will start by reading all the rules. A few samples have been filled in as an example.

Instructions for students:

1. **Read the rules carefully**
<https://firstinspiresst01.blob.core.windows.net/first-forward/fll-challenge/fll-challenge-cargo-connect-robot-game-rulebook.pdf>
2. **Check for any updates**
<https://firstinspiresst01.blob.core.windows.net/first-forward/fll-challenge/fll-challenge-cargo-connect-challenge-updates.pdf>
3. **Brainstorm ideas.** Think about what you might have to build or program to solve this mission.



CARGO CONNECTSM

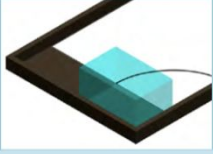

Challenge Updates

Updated 17 August 2021

UPDATE 07 – M11 HOME DELIVERY CLARIFICATION– The following pictures have been provided as additional examples of the food package being on the doorstep partly vs completely:



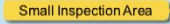
M00
Equipment Inspection Bonus

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.*



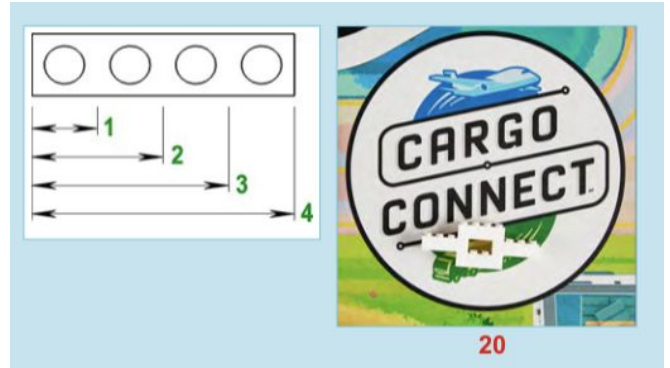

What are some important rules about this mission?

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. After inspection, the inspection area and 12.0 in. (305 mm) high ceiling no longer exists. Spread things out in home as you like.

How can we make sure that to get this bonus?

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.



What are some important rules about this mission?

How can we solve this mission?

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.

What are some important rules about this mission?

How can we solve this mission?

M03 Unload Cargo Plane

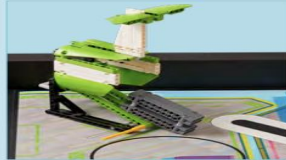


Unloading cargo is an important part of the journey. Planes are often just one of multiple forms of transportation used to deliver cargo containers to their destination.

- 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

What are some important rules about this mission?

How can we solve this mission?

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.

What are some important rules about this mission?

How can we solve this mission?

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**

What are some important rules about this mission?

How can we solve this mission?

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.

What are some important rules about this mission?

Robot needs to complete this at the end of match

Must do this mission carefully because the the black frame needs to be upright at the end

How can we solve this mission?

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**

What are some important rules about this mission?

How can we solve this mission?

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 CONNECTSM** circle: **10**
- If both teams have separated their food packages from their field's helicopters: **10**

What are some important rules about this mission?

How can we solve this mission?

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**

What are some important rules about this mission?

How can we solve this mission?

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.

What are some important rules about this mission?

How can we solve this mission?

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.

What are some important rules about this mission?

How can we solve this mission?

M12 Large Delivery



Transporting large items can lead to unexpected problems, like maneuvering around a chicken statue along the way. It is important to plan ahead so nothing is damaged and your cargo arrives safely.

- If the turbine blade is touching only the blue holder and: **The mat: 20**
Nothing else: 30
- If the chicken statue is upright with its base in its circle: **Partly: 5**
Completely: 10

What are some important rules about this mission?

How can we solve this mission?

M13 Platooning Trucks



Truck platooning is the linking of two or more trucks in transport. This allows trucks to move efficiently, saving time, fuel, and money.

- If both trucks are latched together completely outside of home: **10**
- If a truck is latched to the bridge: **10**
- Bonus: If both of the above are true: **10 added**

What are some important rules about this mission?

How can we solve this mission?

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**

What are some important rules about this mission?

How can we solve this mission?

M16 CARGO CONNECTSM



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).

What are some important rules about this mission?

How can we solve this mission?

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.*

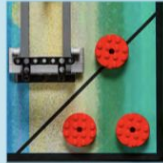
What are some important rules about this mission?

How can we solve this mission?

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

What are some important rules about this mission?

The first token does not cost you points.

How can we solve this mission?