## Solve problems in: The Robot Game

❯ **Read** the Robot Game Rules in the Challenge Guide

❯ **Identify** one or more Missions to solve

❯ **Design** a Robot using LEGO® MINDSTORMS® that can solve the Mission(s)

Missions as written below are only an overview. For full detail, go to http://www.firstlegoleague.org/challenge and download the complete Challenge Guide.

## Scoring Requirement Signals

❯ Within the Mission descriptions, specific **scoring requirements** are written in GREEN.

❯ **Methods with an asterisk ✱** must be the ONLY ones used, and must be OBSERVED by the referee.

❯ Underlined RESULTS/CONDITIONS must be visible at the END of the match.

### M01–Space Travel

✱ **Start each Payload clearly rolling** down the Space Travel Ramp.

- For each roll, the cart must ✱ **be Independent by the time it reaches the first track connection.**
- Vehicle Payload: **22 Points**
- Supply Payload: **14 Points**
- Crew Payload: **10 Points**
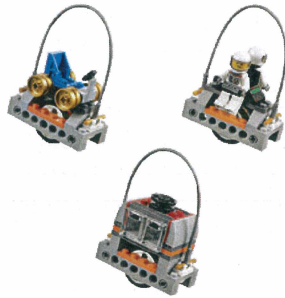
As a Mission requirement in any Mission, the word "Independent" means "not in contact with any of your Equipment." As long as the cart clearly rolls Independently past the First Track Connection, it's OK if it doesn't roll all the way east.

### M02–Solar Panel Array

- **Both Solar Panels are Angled toward the same Field**: 22 Points For Both Teams
- **Your Solar Panel is Angled toward the other team's Field**: 18 Points
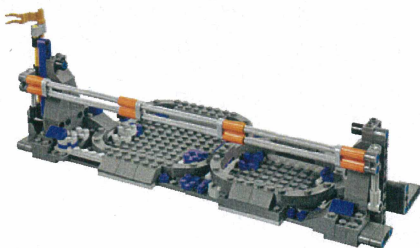
### M03–3D Printing

- Eject the 2x4 Brick ✱ **by placing a Regolith Core Sample into the 3D Printer.**
- The 2x4 Brick ejected and **completely in the Northeast Planet Area**: 22 Points
- OR The 2x4 Brick **ejected and not completely** in the Northeast Planet Area: 18 Points
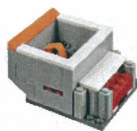
### M04–Crater Crossing

- All weight-bearing features of the crossing equipment must cross ✱ **completely between the towers.**
- Crossing must be ✱ **from east to west, and make it completely past the flattened Gate**: 20 Points

### M05–Extraction

- Move all **four Core Samples so they are no longer touching the axle that held them in the Core Site Model**: 16 Points
- Place the Gas Core Sample so it is **touching the mat, and completely in the Lander's Target Circle**: 12 Points
- OR Place the Gas Core Sample **completely in Base**: 10 Points
- Place the Water Core Sample so it is **supported only by the Food Growth Chamber**: 8 Points
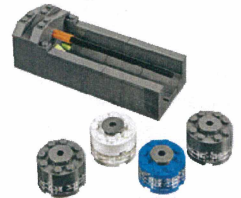
### M06–Space Station Modules

- Inserted Modules must **not be touching anything except the Habitation Hub**.
- Move the Cone Module **completely into Base**: 16 Points
- Insert the Tube Module **into the Habitation Hub port, west side**: 16 Points
- Transfer/Insert the Dock Module **into the Habitation Hub port, east side**: 14 Points
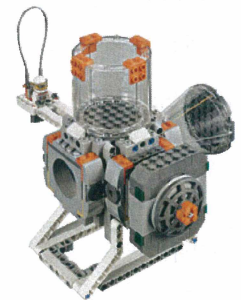
### M07–Space Walk Emergency

- Move Gerhard so his body is inserted **at least partly into the Habitation Hub's Airlock Chamber**.
- Completely In: **22 Points**
- OR Partly In: **18 Points**

For this Mission, the word "Body" includes all parts except the loop.

### M08–Aerobic Exercise

- Advance the Exercise Machine's Pointer along its Dial ✱ **by moving one or both of the Handle Assemblies.**
- Get the Pointer tip **completely in orange, or partly covering either of orange's end-borders**: 22 Points
- OR Get the Pointer tip **completely in white**: 20 Points
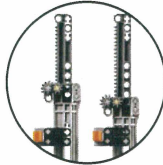- OR Get the Pointer tip **completely in gray, or partly covering either of gray's end-borders**: 18 Points
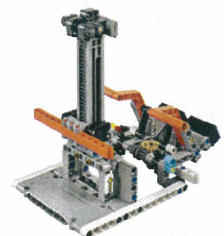
## M09–Strength Exercise

- Lift the Strength Bar <u>so the tooth-strip's 4th hole comes at least partly into view as shown</u>: 16 Points

## M10–Food Production

- Spin the Food Growth Chamber's colors so the <u>gray weight is DROPPED after green, but before tan,</u> * by moving the Push Bar: 16 Points
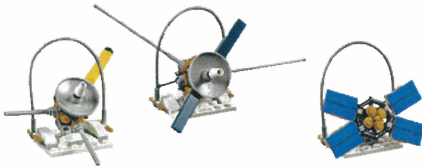
## M11–Escape Velocity

- Get the spacecraft to go so fast and high that it <u>stays up,</u> * by pressing/hitting the Strike Pad: 24 Points

## M12–Satellite Orbits

- Move any part of a Satellite <u>on or above the area between the two lines of the Outer Orbit</u>: 8 Points Each

## M13–Observatory

- Get the pointer tip <u>completely in orange, or partly covering either of orange's end-borders</u>: 20 Points
- <u>OR</u> Get the pointer tip <u>completely in white</u>: 18 Points
- <u>OR</u> Get the pointer tip <u>completely in gray, or partly covering either of gray's end-borders</u>: 16 Points
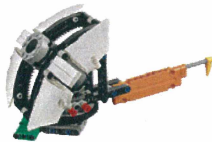
## M14–Meteoroid Deflection

- Send Meteoroids * over the Free-Line to <u>touch the mat in the Meteoroid Catcher</u>.
- The Meteoroids must be hit/released while they are * **clearly and completely west of the Free-Line.**
- While between hit/release and scoring position, the Meteoroid * **must be clearly Independent.**
- Meteoroids in the Center Section: **12 Points Each**
- Meteoroids in Either Side Section: **8 Points Each**

If ever the Ring-Set Meteoroid is off its Ring, you may remove the Ring from the Field by hand (this is a special exception to the Rules).

## M15–Lander Touch-Down

- Move the Lander to be <u>intact, touching the Mat, and completely in its Target Circle</u>: 22 Points
- <u>OR</u> Move the Lander to be <u>intact, touching the Mat, and completely in the Northeast Planet Area</u>: 20 Points
- <u>OR</u> Move <u>both parts of the Lander completely into Base</u>: 16 Points

The Lander is "Intact" if its parts are connected by at least two of its four tan location axles.

## P01–Interruption Penalties

- If you * Interrupt the Robot: **Minus 3 Points Each Time**
- Upon Penalty, the referee will place one Penalty Disc in the southeast triangle as a permanent Interruption marker. You can get up to six such Penalties.
- If a Penalty Disc comes off the triangle, it is simply returned, with no effect on score.
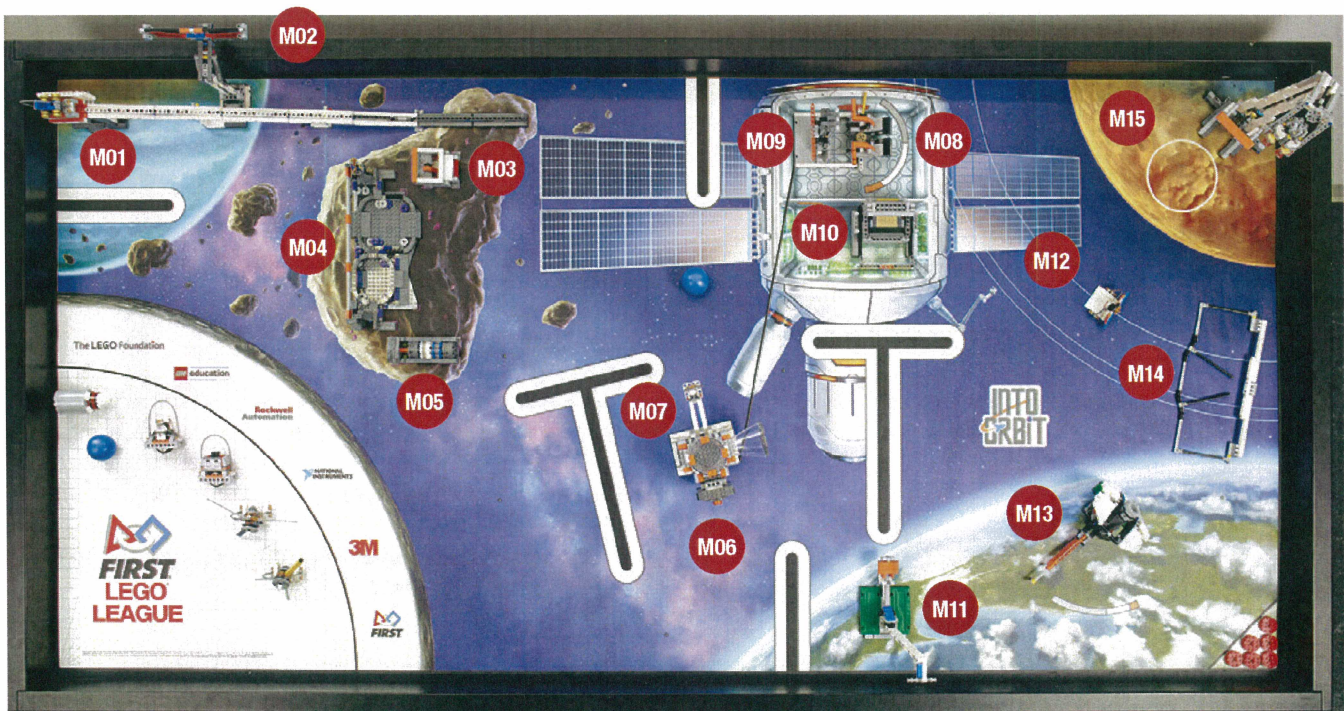
*The Robot Game Missions can provide real-world examples for your Project research. Learn about the stories behind the Missions in the Challenge Guide:* http://www.firstlegoleague.org/challenge.