

The Robot Game Rules

GUIDING PRINCIPLES

GP1 – Gracious Professionalism® - You are “Gracious Professionals.” You compete hard against problems, while treating all people with respect and kindness. If you joined FIRST® LEGO® League with a main goal of “winning a robotics competition,” you’re in the wrong place!

GP2 – Interpretation

- If a detail isn’t mentioned, then it doesn’t matter.
- Robot Game text means exactly and only what it plainly says.
- If a word isn’t given a game definition, use its common conversational meaning.

GP3 – Benefit of the Doubt - If the Referee (Ref) feels something is a “very tough call,” and no one can point to strong text in any particular direction, you get the Benefit Of The Doubt. This good-faith courtesy is not to be used as a strategy.

GP4 - Variability - Our suppliers and volunteers try hard to make all **Fields** correct and identical, but you should always expect little defects and differences. Top teams design with these in mind. Examples include Border Wall splinters, lighting changes, and **Field** Mat wrinkles.

GP5 - Information Superiority - If two official facts disagree, or confuse you when read together, here’s the order of their authority (with #1 being the strongest):

#1 = Current Robot Game UPDATES

#2 = MISSIONS and FIELD SETUP

#3 = RULES

#4 = LOCAL HEAD REF - In unclear situations, local Head Referees may make good-faith decisions after discussion, with Rule GP3 in mind.

- Pictures and video have no authority, except when talked about in #1, #2, or #3.
- Emails and Forum comments have no authority.

DEFINITIONS

D01 - Match - A “**Match**” is when two teams play opposite each other on two **Fields** placed north to north.

- Your Robot **LAUNCHES** one or more times from **Base** and tries as many **Missions** as possible.
- **Matches** last 2-1/2 minutes, and the timer never pauses.

D02 - Mission - A “**Mission**” is an opportunity for the Robot to earn points. Missions are written in the form of requirements.

- Most are results that must be visible to the Ref at the end of the match.
- Some are actions that must be watched/approved by the Ref as they happen.

- If a **Mission** has any “more” requirements, they must all be met, or the whole **Mission** scores zero.

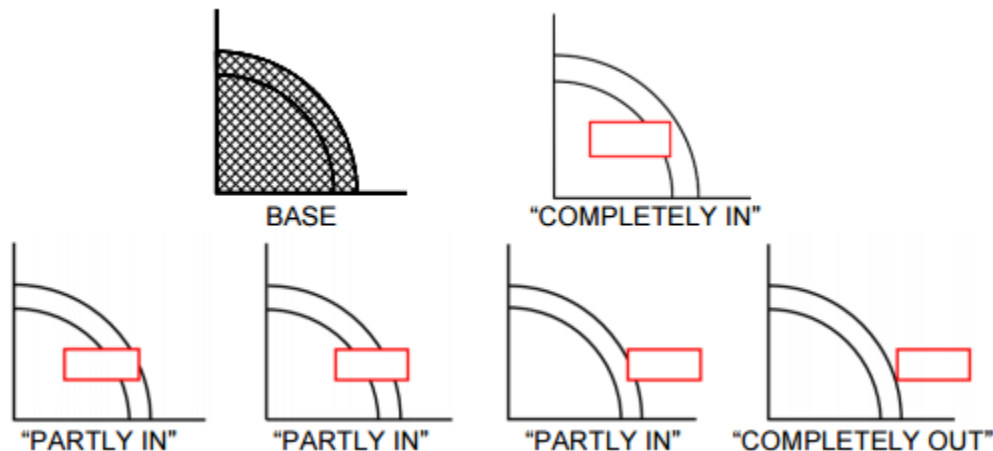
D03 - Equipment - “**Equipment**” is everything you bring to a Match for **Mission**-related activity.

D04 - Robot - Your “Robot” is your LEGO® MINDSTORMS® controller and all the **Equipment** you’ve combined with it by hand which is not intended to separate from it, except by hand.

D05 - Mission Model - A “**Mission Model**” is any LEGO object already at the **Field** when you get there. **Mission Models** are not the same as “**Equipment**.”

D06 - Field - The “**Field**” is the Robot’s game environment, consisting of **Mission Models** on a Mat, surrounded by Border Walls, all on a Table. “**Base**” is part of the **Field**. For full details, see Field Setup: <http://firstlegoleague.org/challenge#animal-allies>.

D07 - Base - “**Base**” is the space directly above the **Field**’s larger quarter-circle region, in the southwest corner. It extends southwest from the outer curved line to each wall (no farther), and has no ceiling. The diagrams below define “Completely In” for **Base**, but apply for any area.



D08 - Launch - Whenever you’re done handling the Robot and then you make it go, that’s a “**Launch**.”

D09 - Interruption - The next time you interact with the Robot after **Launching** it, that’s an “**Interruption**.”

D10 - Transporting - If the Robot is in contact with something for the obvious purpose of taking it, changing its location, or releasing it, the robot is “**Transporting**” it.

EQUIPMENT, SOFTWARE, AND PEOPLE

R01 - All **Equipment** - All **Equipment** must be made of LEGO-made building parts in original factory condition.

Except: LEGO string and tubing may be cut shorter.

Except: Program reminders on paper are okay (off the **Field**).

Except: Marker may be used in hidden areas for identification.

R02 - Controllers - You are allowed only one individual controller in any particular Match.

- It must exactly match a type shown below (Except: Color).
- All other controllers must be left in the Pit Area for that Match.
- All remote control or data exchange with Robots (including Bluetooth) in the competition area is illegal.
- This rule limits you to only one individual Robot in any particular Match.



R03 - Motors - You are allowed up to four individual motors in any particular Match.

- Each one must exactly match a type shown below.
- You may include more than one of a type, but again, your grand total may not be greater than FOUR.
- ALL other motors must be left in the Pit Area for that Match, no exceptions.



R04 - External Sensors - Use as many external sensors as you like.

- Each one must exactly match a type shown below.
- You may include more than one of each type.



[Update #2] Our Challenge Guide misidentifies the touch sensor. The words “GYRO/ANGLE” are under the touch sensor rather than the Gyro Sensor. The picture of the Gyro sensor is just labeled as EV3.

R05 - Other Electric/Electronic Things - No other electric/electronic things are allowed in the competition area for **Mission**-related activity.

Except: LEGO wires and converter cables are allowed as needed.

Except: Allowable power sources are one controller’s power pack or six AA batteries.

R06 - Non-Electric Elements - Use as many non-electric LEGO-made elements as you like, from any set.

Except: Factory-made wind-up/pull-back “motors” are not allowed.

Except: Additional/duplicate **Mission Models** are not allowed.

R07 - Software - The Robot may only be programmed using LEGO MINDSTORMS RCX, NXT, EV3, or RoboLab software (any release). No other software is allowed. Patches, add-ons, and new versions of the allowable software from the manufacturers (LEGO and NI) are allowed, but tool kits, including the LabVIEW tool kit, are not allowed.

R08 - Technicians

- Only two team members, called “Technicians,” are allowed at the competition **Field** at once. Except: Others may step in for true emergency repairs during the Match, then step away.

- The rest of the team must stand back as directed by tournament officials, with the expectation of fresh Technicians being able to switch places with current Technicians at any time if desired.

PLAY

R09 - Before The Match Timer Starts - After getting to the **Field** on time, you have at least one minute to prepare. During this special time only, you may also...

- Ask the Ref to be sure a **Mission Model** or setup is correct.
- Calibrate light/color sensors anywhere you like.

R10 - Handling During the Match

- You are not allowed to interact with any part of the **Field** that's not COMPLETELY in **Base**.

Except: You may **Interrupt** the Robot any time.

Except: You may pick up **Equipment** that broke off the Robot unintentionally, anywhere, any time.

- You are not allowed to cause anything to move or extend over the **Base** line, even partly.
Except: Of course, you may **Launch** the Robot. Except: You may move/handle/Store things off the **Field**, any time.
Except: If something accidentally crosses the **Base** line, just calmly take it back – no problem.
- Anything the Robot affects (good or bad!) or puts completely outside **Base** stays as is unless the Robot changes it. Nothing is ever repositioned so you can “try again.”

R11 - **Mission Model** Handling

- You are not allowed to take **Mission Models** apart, even temporarily.
- If you combine a **Mission Model** with something (including the Robot), the combination must be loose enough that if asked to do so, you could pick the **Mission Model** up and nothing else would come with it.

R12 - Storage

- Anything completely in **Base** may be moved/stored off the **Field**, but must stay in view of the Ref, on a stand.
- Everything in off-**Field** Storage “counts” as being completely in **Base**.

R13 - **Launching** - A proper **Launch** (or re- **Launch**) goes like this:

- Ready Situation
 - o Your Robot and everything in **Base** it's about to move or use is arranged by hand as you like, all fitting completely in **Base**.
 - o The Ref can see that nothing on the **Field** is moving or being handled.
- Go!
 - o Reach down and touch a button or signal a sensor to activate a program.

First **Launch** of the Match – Here, accurate fair timing is needed, so the exact time to **Launch** is the beginning of the last word/sound in the countdown, such as “Ready, set, GO!” or BEEEP!

R14 - **Interrupting** - If you **Interrupt** the Robot, you must stop it immediately, *then calmly pick it up for a re- **Launch** (*if you intend one). Here’s what happens to the Robot and any object it was **Transporting**, depending on where each was at the time:

- Robot
 - o Completely in **Base**: Re- **Launch**
 - o NOT completely in **Base**: Re- **Launch** + Penalty
- Transported Object
 - o Completely in **Base**: Keep it
 - o NOT completely in **Base**: Give it to the Ref The “Penalty” is described with the MISSIONS.

R15 - **Stranding** - If the Un**interrupted** Robot loses something it was **Transporting**, that thing must be allowed to come to rest. Once it does, here’s what happens to the Transported object, depending on its rest location...

- Transported Object
 - o Completely in **Base**: Keep it
 - o Partly in **Base**: Give it to the Ref
 - o Completely outside **Base**: Leave as is

R16 - **Interference**

- You are not allowed to negatively affect the other team except as described in a **Mission**.
- **Missions** the other team tries but fails because of illegal action by you or your Robot will count for them.

R17 - **Field Damage**

- If the Robot separates Dual Lock or breaks a **Mission Model**, **Missions** obviously made possible or easier by this damage or the action that caused it do not score.

R18 - **End of the Match** - As the Match ends, everything must be preserved exactly as-is...

- If your Robot is moving, stop it as soon as possible and leave it in place. (Changes after the end don’t count.)
- After that, hands off everything until after the Ref has given the okay to reset the table.

R19 - **Scoring**

- Scoresheet - The Ref discusses what happened and inspects the **Field** with you, **Mission** by **Mission**.
 - o If you agree with everything, you sign the sheet, and the scoresheet is final.
 - o If you don’t agree with something, the Head Ref makes the final decision.
- Impact - Only your best score from regular Match play counts toward awards/advancement. Playoffs, if held, are just for extra fun.

- Ties - Ties are broken using second, then third best scores. If still not settled, tournament officials decide what to do.

SERIOUS CHANGES FOR 2016 (All are the effects of simplifications.):

- There is no “Safety” region now. The whole quarter-circle region is all **Base**. The inner curved line is meaningless now.
- The ceiling of **Base** has been removed, so there is no limit on how tall a **Launching** Robot may be.
- Transported objects partly in **Base** when the Robot is **Interrupted** are always given to the Ref, out of play.
- Stranded objects partly in **Base** are always given to the Ref, out of play.
- On-**Field** Storage outside **Base** no longer allowed.
- If the Robot is **Interrupted Transporting** an object not completely in **Base**, the Ref now keeps that object no matter what.
- There is no “Junk” penalty.
- Local Head Referee responsibility is enhanced.
- The “Benefit Of The Doubt” rule is strengthened.

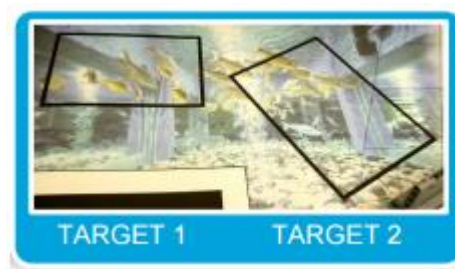
The Robot Game Missions

M01 - SHARK SHIPMENT -

Move the Shark to her new home not touching her tank's walls.

EXACT SCORING REQUIREMENT OPTIONS:

- Visible at the end of the match:
 - Tank and Shark are completely in:
 - Target 1: 7 Points,
 - OR
 - Target 2: 10 Points
- Bonus (Added only if a Target score is earned): Shark is touching only the tank floor and no wall: 20 Points
- More: After **Launch** for this **Mission**, nothing is ever allowed to touch the Shark except the Tank.



M02 - SERVICE DOG ACTION

Drive past the visually impaired man, and the dog will do her job.

EXACT SCORING REQUIREMENTS:

- Visible at the end of the match:
 - The Warning Fence is down: 15 Points
- More: The Fence must be down because the Robot completely crossed it from the west, after traveling between the Barriers: Y/N



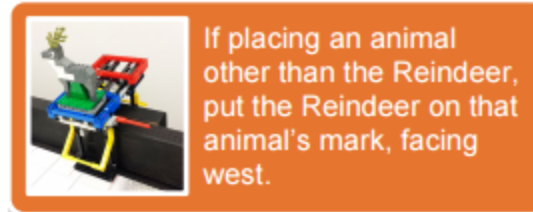
M03 - ANIMAL CONSERVATION

Work with the other team to unite identical animals. Every pair united will score for BOTH teams, no matter who worked on that union.

- Before the Match starts, hand-place your choice of one animal in your tray of the Animal Conservation **Mission Model**. The placement must match one of these *options:
 - o Reindeer facing west
 - o Gorilla facing south
 - o Bat facing south
 - o Flamingo facing east
 - o Frogs facing south & west
 - o If placing another animal other than Reindeer, put Reindeer on that animal's mark facing west
- During the Match, participating Robots make the trays switch places. A switch is officially successful when the red axle causes the system to stop. Robots then have the option of removing the received animal and replacing it with a different animal for switching. The Referee resets the red axle.

EXACT SCORING REQUIREMENTS:

- Visible at the end of the match:
 - o Two identical animals are completely on the same **Side: 20 Points per pair
 - o Both teams get points for all pairs.
- More: Each pair must be created through rotation of the Animal Conservation **Mission Model**: Y/N
- *The five optional animals listed in this mission are the only ones allowed for exchange.
- **For M03, a "Side" is anywhere completely south of the symmetric line between **Fields**, including that **Field**'s Storage areas.



[Update #3] It is unclear when to treat the Frogs as two animals, so here are the rulings:

- Each Frog meeting scoring requirements will score.
- It is OK to load the Frog Model at the start of the match.

M04 - FEEDING -

Deliver food from the Refrigerator to Target Animal Areas.

EXACT SCORING REQUIREMENTS:

- Visible at the end of the match:
 - o A piece of Food is completely in a Target Area: 10 Points (Each Piece)
- More: If multiple pieces of Food are in one area, all must match each other: Y/N



[Update #4] If multiple pieces of Food are in one area, but are not alike, only the points for that particular Target Area do not count.

M05 – BIOMIMICRY

Test our ability to mimic the Gecko's "stickiness" by placing the White (mechanical) Gecko on the Biomimicry Wall, and/or by seeing if the Robot itself can get onto the wall.

EXACT SCORING REQUIREMENTS:

- Visible at the end of the match: The Biomimicry Wall completely supports:
 - o All the weight of the White Gecko: 15 Points
 - o All the weight of the Robot: 32 Points
- More: For an object to score, no part of it may be in contact with anything but the Biomimicry Wall and/or Green Gecko, except two scoring objects may be in contact with each other: Y/N

M06 - MILKING AUTOMATION

Guide the cow into the machine, then spin the machine until Milk comes out. If you spin too far, *Manure also comes out!

EXACT SCORING REQUIREMENTS:

- Visible at the end of the match:
 - o Milk and Manure have all rolled out: 15 Points
 - o Milk has all rolled out, but not Manure: 20 Points
- More: The Robot's only movement of the Milk and/or Manure came by moving the red lever: Y/N



M07 - PANDA RELEASE –

Convert the Panda's scene from facility care and observation to open wilderness.

EXACT SCORING REQUIREMENT:

- Visible at the end of the match:
 - o The slider looks fully open clockwise: 10 Points



M08 - CAMERA RECOVERY

Go get the camera and bring it to **Base**.

EXACT SCORING REQUIREMENTS:

- Visible at the end of the match:
 - o The Camera is completely in **Base**: 15 Points

M09 - TRAINING AND RESEARCH

Move the Dog & Trainer, Zoologist, and/or Manure Samples to the Training & Research Area.

[Update #4] If more than one Manure Sample is Transported at a time, only those particular Manure Samples will not count. Other/legally Transported Manure Samples are unaffected.

EXACT SCORING REQUIREMENTS/OPTIONS:

- Visible at the end of the match:
 - o The Dog & Trainer are completely in the Training & Research Area: 12 Points
 - o The Zoologist is completely in the Training & Research Area: 15 Points
 - o Manure *Samples are completely in the Training & Research Area: 5 Points Each

- More: Only one Manure Sample may be Transported at a time: Y/N

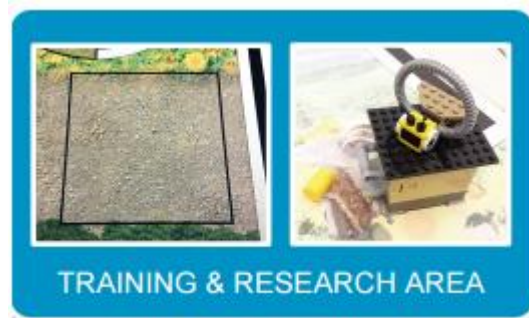
*Only disc-shaped Manure counts as Samples.

M10 - BEE KEEPING –

Place the Bee on the Beehive and get the Honey out.

EXACT SCORING REQUIREMENTS/OPTIONS:

- Visible at the end of the match:
 - o The Bee is on the Beehive and there is no Honey in the Beehive: 12 Points OR
 - o The Bee is on the Beehive and the Honey is completely in **Base**: 15 Points



M11 - PROSTHESIS -

Fit the Prosthesis where the legs of the Pet (Our Little Friend) should be, and send the Pet to its place on the farm.

EXACT SCORING REQUIREMENTS/OPTIONS:

- Visible at the end of the match:
 - o The Prosthesis is fitted to the Pet AND not held by the Ref: 9 Points
- OR

- o The Prosthesis is fitted to the Pet AND the Pet is completely in its Farm Target: 15 Points



M12 - SEAL IN BASE

- Visible at the end of the match:
 - o The Seal is completely in Base and not broken: 1 Point

M13 - MILK IN BASE

- Visible at the end of the match:
 - o All three Milk are completely in Base: 1 Point

M14 - MILK ON RAMP

- Visible at the end of the match:
 - o Option 1: 2 Points
 - ♣ All three Milk are completely supported by the Ramp
 - o Option 2: 3 Points
 - ♣ All three Milk are completely supported by the Ramp,
 - ♣ AND they're the only things supported by the Ramp,
 - ♣ AND they're the only things touching the Ramp
 - o Option 3: 4 Points
 - ♣ All three Milk are completely supported by the Ramp,
 - ♣ AND they're the only things supported by the Ramp,
 - ♣ AND they're the only things touching the Ramp,
 - ♣ AND they're all standing

M15 - ALL SAMPLES

- Visible at the end of the match:
 - o All ~~twelve~~ seven [Update #1] Manure Samples are completely in the Training And Research Area: 5 Points Added To M09

PENALTIES –

Before the match starts, the Ref removes five Manure Samples from Base, and holds on to them, leaving five still there. If you **Interrupt** the Robot, the Ref places one of the removed Samples in the white triangle, in the southeast, as a permanent/untouchable **Interruption** Penalty. You can get up to five such penalties, worth Minus 6 Points Each

