2017/2018 Robot Game Rules (updated to Jan 9, 2018)

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 requirements are RESULTS that must be visible to the Ref at the END OF THE MATCH.

• Some requirements are METHODS that must be observed by the Ref AS THEY HAPPEN.

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 element or structure ALREADY AT THE FIELD when you get there.

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. Download the Field Setup Guide at www.firstlegoleague.org/challenge.

D07 - BASE - "Base" is the space directly above the Field's quarter-circle region, in the southwest. It extends southwest from the curved line TO the corner walls (no farther). The diagrams below define "COMPLETELY IN" for Base, but apply for ANY area

| YES (COMPLETELY IN) | YES (COMPLETELY IN) | NO (PARTLY IN) | NO (PARTLY IN) | NO (PARTLY IN) | NO (OUT) | NO (OUT) |
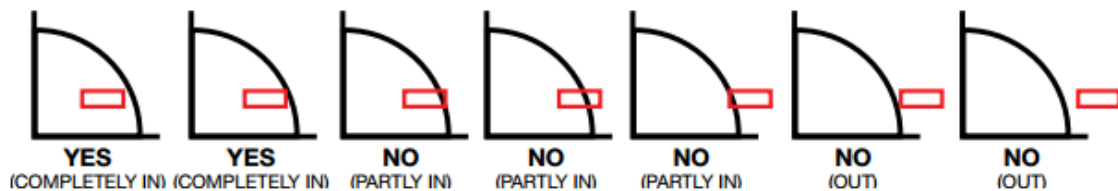
Update #4 – D07, 6th PICTURE, DISCUSSION – Oct 21, 2017/Nov 7, 2017
In Rule D07, ignore the 6th picture and its caption.

Update #8 Base Return Leniency – Nov 7, 2017
A Robot entering Base will be considered "completely in Base" as soon as it matches the 2nd picture in Rule D07 even if there are portions of the Robot or something it has transported partially past the west or south border walls. This leniency does not apply for Launches.

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 - TRANSPORTED - When a thing (anything) is purposefully/strategically being…
• taken from its place, and/or
• moved to a new place, and/or • being released in a new place, it is being "Transported."
The process of being Transported ends when the thing being transported is no longer in contact with whatever was 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.

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 National Instruments) 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.

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, and/or
• 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.

Update #6 Remote Storage – Nov 7, 2017
Team members away from the table may hold Equipment after the referee has seen all of it in one place, but Models must stay in view of the referee.

R13 - LAUNCHING - A proper Launch (or reLaunch) 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" and measuring no taller than 12 inches" (30.5 cm).
        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 BEEEEP!

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 anything 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 THING**

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 UNINTERRUPTED Robot loses something it was Transporting, that thing must be allowed to come to rest. Once it does, here's what happens to that thing, depending on its rest location:

- **TRANSPORTED THING**

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 ASAP 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 2nd, then 3rd best scores. If still not settled, tournament officials decide what to do.

CHANGES FOR 2017
- The word "objects" has been replaced with the word "things" for parallelism with the term "anything."
- Definition of "Transporting" is opened up for situations not directly involving the Robot.
- Maximum Equipment height UPON LAUNCH is now limited.

2017/2018 Robot Game Missions

*Asterisks tell you a specific METHOD is required, and must be observed by the referee. Underlined conditions must be visible at the END of the match.

M01 - PIPE REMOVAL Move the Broken Pipe so it is completely in Base. 20 Points

M02 - FLOW *Move a Big Water (one time maximum) to the other team's field *only by turning the Pump System's valve(s). 25 Points

M03 - PUMP ADDITION Move the Pump Addition so it has contact with the mat and that contact is completely in the Pump Addition target. 20 Points

Update #5 – PUMP DUAL LOCK – Oct 21, 2017
If you press your Pump Model against the wall but some of the Dual Lock is still visible (higher than the wall), re-apply the Dual Lock lower as needed until it's no longer visible. Unlike with other Models, the precise Dual Lock pattern for this Model is not critical. Just be sure some pairs are low, and some pairs are as high as possible without being visible.

M04 - RAIN Make at least one Rain come out of the Rain Cloud. 20 Points

M05 - FILTER Move the Filter north until the lock latch drops. 30 Points

M06 - WATER TREATMENT Make the Water Treatment model eject its Big Water, *only by moving the Toilet's lever. 20 Points

M07 - FOUNTAIN Make the Fountain's middle layer rise some obvious height and stay there, due only to a Big Water in the gray tub. 20 Points

M08 - MANHOLE COVERS Flip Manhole cover(s) over, obviously past vertical *without it/them ever reaching Base. 15 Points EACH Each cover is scored individually.

FOR BONUS: Score 30 Manhole Cover points as described above. WITH both covers completely in separate Tripod targets. 30 Points Added

M09 - TRIPOD Move the inspection camera Tripod so it is
FOR PARTIAL SCORE: partly in either Tripod target, with all of its feet touching the mat. 15 Points
FOR FULL SCORE: completely in either Tripod target, with all of its feet touching the mat. 20 Points

M10 - PIPE REPLACEMENT (Install the Optional Loop first, in Base, if you wish.)
Move a New Pipe so it is where the broken one started, in full/flat contact with the mat. 20 Points


Update #3 OPTIONAL LOOP OVERHANG – Oct 21, 2017
The Optional Loop sometimes tilts out of the airspace above Pipe scoring area. This has no effect on the scoring.

M11 - PIPE CONSTRUCTION (Install the Optional Loop first, in Base, if you wish.)
Move a New Pipe so it is
FOR PARTIAL SCORE: partly in its target, in full/flat contact with the mat. 15 Points
FOR FULL SCORE: completely in its target, in full/flat contact with the mat. 20 Points

NO

PARTIAL

FULL

M12 - SLUDGE Move the Sludge so it is touching the visible wood of any of the six drawn garden boxes. 30 Points

SCORE

SCORE

NO

M13 - FLOWER Make the Flower rise some obvious height and stay there, due only to a Big Water in the brown pot. 30 Points
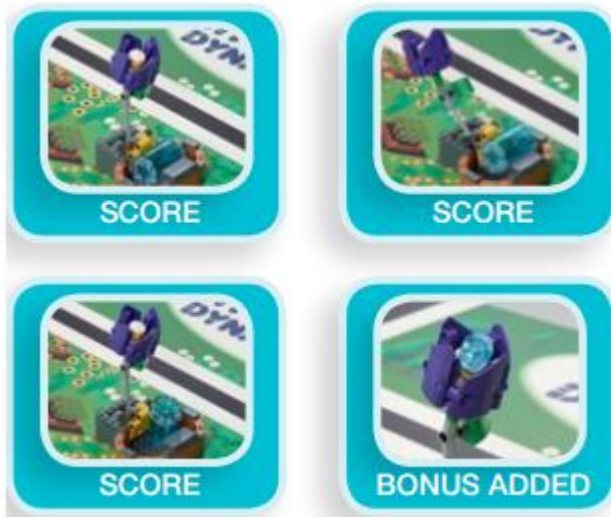
FOR BONUS: Score Flower Points as described above WITH at least one Rain in the purple part, touching nothing but the Flower model. 30 Points Added

M14 - WATER WELL Move the Water Well so it has contact with the mat and that contact is
FOR PARTIAL SCORE: partly in the Water Well target. 15 Points
FOR FULL SCORE: completely in the Water Well target. 25 Points

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M15 - FIRE Make the fire drop *only by making the Fire truck apply direct force to the House's lever. 25 Points

M16 - WATER COLLECTION Move or catch Big Water and/or Rain water (one Rain maximum; no Dirty Water) so it is touching the mat in the Water Target, *without the target ever reaching the white Off-Limits Line shown below. Water may be touching the target, and/or other water, but not be touching nor guided by anything else. Each water model is scored as an individual.
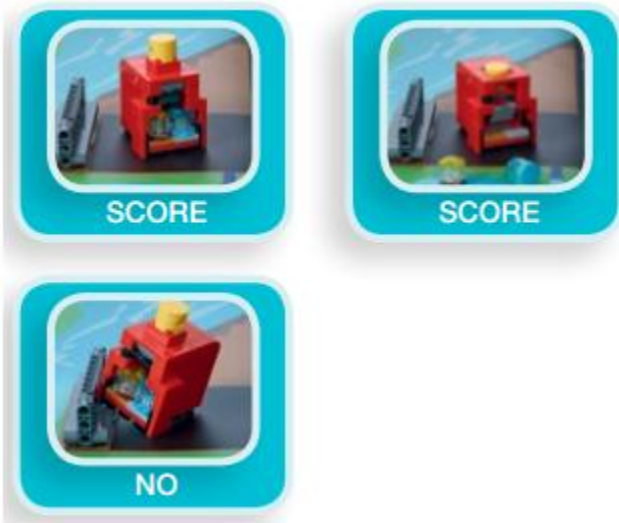At least one Rain: 10 Points Big Water: 10 Points EACH

FOR BONUS: Score at least one Big Water in its target as described above WITH one on top, which is touching nothing but other water. 30 Points (Maximum only one Bonus can score)

M17 - SLINGSHOT Move the SlingShot so it is completely in its target. 20 Points

FOR BONUS: Score SlingShot points as described above WITH the Dirty Water and a Rain completely in the SlingShot target. 15 Points Added

M18 - FAUCET Make the water level obviously more blue than white as seen from above the cup, *only by turning the Faucet handle. 25 Points

PENALTIES - Before the match starts, the Ref removes the six red Penalty discs from the Field, and holds on to them. 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 six such penalties, worth -5 Points EACH

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During A Match

Robot touched	Robot	Model/Equipment
Completely in Base	OK—no penalty and re-launch	OK—keep it
Not Completely in Base	Interruption penalty and re-launch	If launched from base – team keeps it If not launched from base – Taken out of play and held by the referee

Robot loses contact with something	Model/Equipment
Completely in Base	OK—keep it
Partly in Base (stranded on baseline)	Take out of play
Completely out of Base	Leave where it is