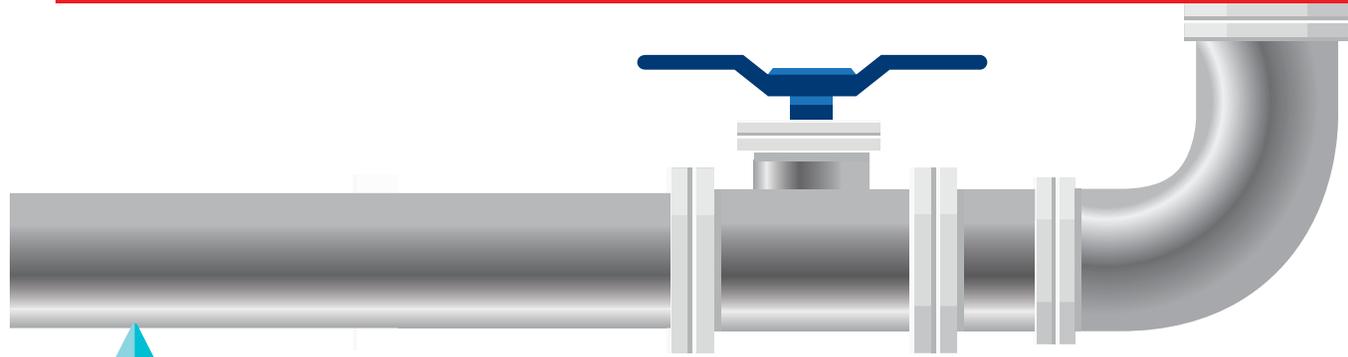
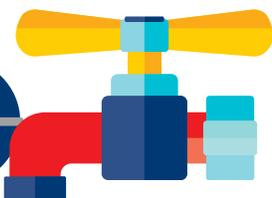
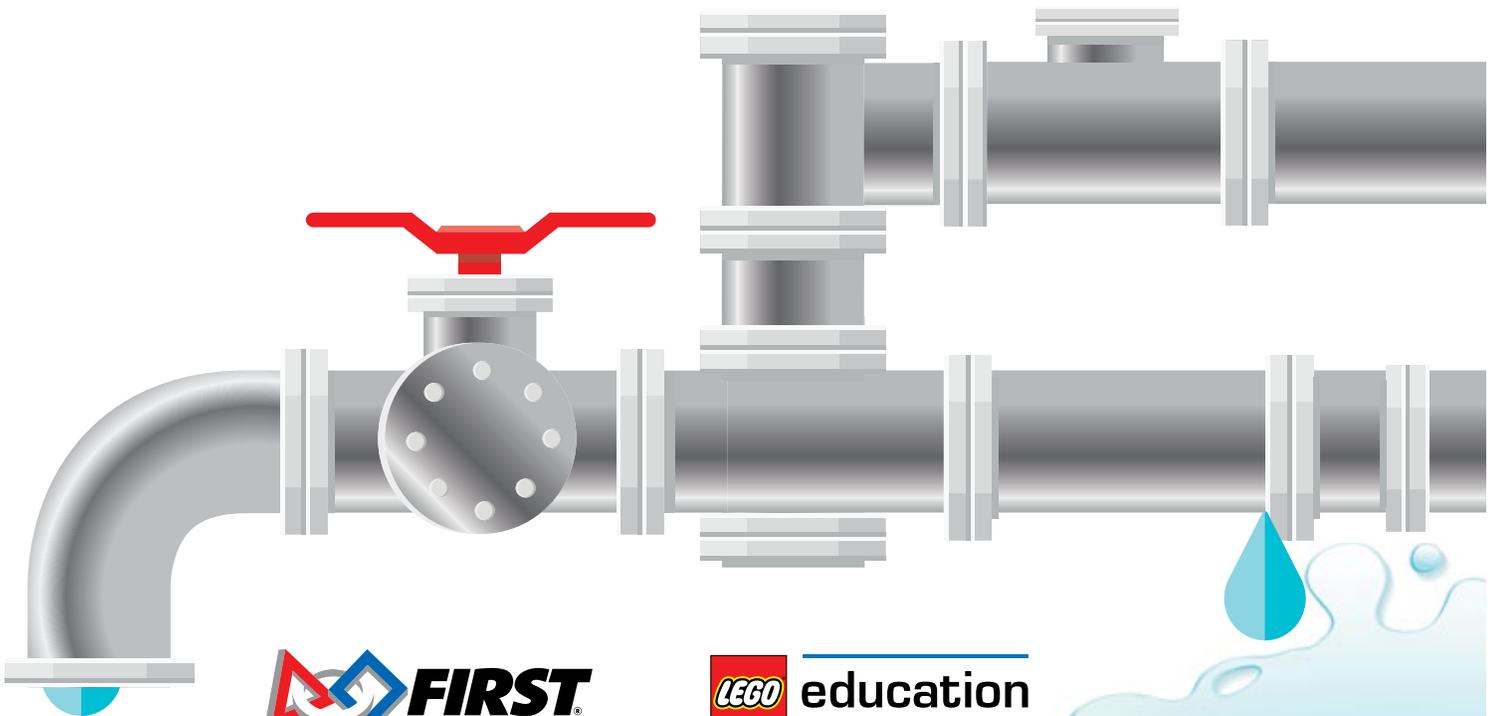


**FIRST
LEGO
LEAGUE**

2017/2018
Robot Game Field Setup



**HYDRO
DYNAMICS**  SM



2017/2018 Robot Game Field Setup

The Field is where the Robot Game takes place.

- It consists of a Field Mat, on a Table with Border Walls, with Mission Models arranged on top.
- The Field Mat and the LEGO® elements for building the Mission Models are part of your Challenge Set.
- The instructions for building the Mission Models are [HERE](#).
- The instructions for how to build the Table and how to arrange everything on it are below.

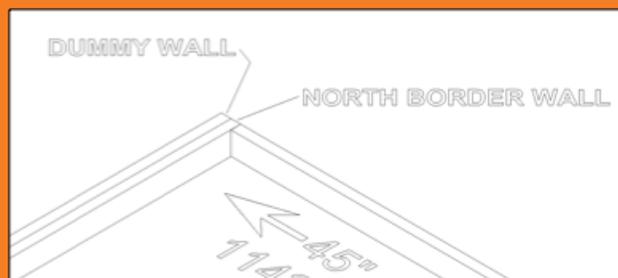
Table Construction

The Robot Game takes place on a Table with specific features, so you'll need to build one to practice on if you don't already have access to one. With weight, height, simplicity and cost in mind, a simple design is offered here, but as long as your surface is smooth, and your Border Walls are sized and located properly, how you build the understructure is up to you. The construction is simple, but does require some wood-working skill.

At a tournament, two Tables are placed back to back, but you only operate on one Table, so you only need to build one Table to practice on.

DUMMY WALL

Most Robot Games have a “shared” Mission, whose Mission Model(s) rest partly on your Table, and partly on the other team's Table, which is connected to your Table's north side. You don't need to build a second table, but you do need to build the necessary part of the other team's Table, so the shared Mission Model(s) can be positioned correctly. Here are the instructions for building one Practice Table, including its Dummy Wall:



MATERIALS

Material	Quantity
Challenge Set (Mission Model LEGO elements, Mat, Dual Lock™)	1
sanded plywood (or other very smooth board) 96" X 48" X at least 3/8" (2438mm X 1219mm X 10mm)	1
*two-by-three, 8' (2438mm) [actual cross-section = 1-1/2" X 2-1/2" (38mm X 64mm)]	6
flat black paint	1 pt. (1/2 L)
coarse drywall screws, 2-1/2" (64mm)	1/2 lb. (1/4 kg)
saw horses, about 24" (610mm) high and 36" (914mm) high	2

*NOTE: Tables with “two-by-four” walls are legal and common, but we're slowly phasing them out at tournaments. You may make your Practice Tables with two-by-four walls, but **you must be prepared to play on tables whose walls could range in height anywhere between 2-1/2" (64mm) and 3-1/2" (90mm), as shown in the diagram on the following page.**

PARTS

Part	Make From	Dimensions	Paint	Quantity
Table surface (A)	plywood	96" X 48" (2438mm X 1219mm)	no	1
long Border Wall (B)	two-by-three	96" (2438mm)	yes	3
short Border Wall (C)	two-by-three	45" (1143mm)	yes	2
*stiffener (D)	two-by-three	48" (1219mm)	no	4
saw horse	purchase	H = 24" (610mm) W = 36" (914mm)	no	2

*If you are using a table surface thicker than 1/2" (13mm) check for warpage/distortion – you may not need stiffeners.

ASSEMBLY

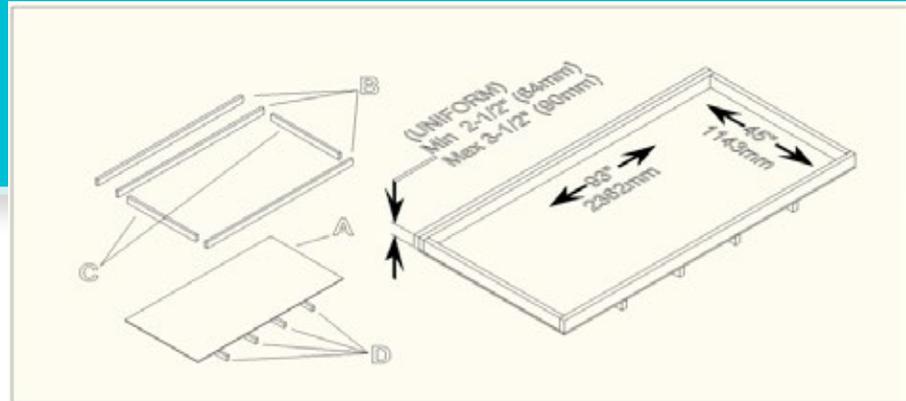
STEP 1 - See which face of the plywood (A) is least smooth, and consider that the bottom face. On the bottom face, clamp, then screw on the stiffeners (D) about every 18" (457mm). Be sure screw heads and splinters don't protrude.

STEP 2 - On the top face of the plywood, locate, clamp, and screw on the Border Walls (B,C) around the top perimeter.

- The inside wall-to-wall dimensions must measure $93\pm 1/8"$ by $45\pm 1/8"$ ($2362\pm 3\text{mm}$ by $1143\pm 3\text{mm}$).

- The height of B and C must measure between $2-1/2"$ (64mm) and $3-1/2"$ (90mm).
- All order Walls must be the same height as each other on all Tables at a tournament. Border heights at a tournament may be different than those on your practice Table.

STEP 3 - Place this table top on short saw horses (or milk crates, or anything else short and solid).



Field Mat Placement

STEP 1 - Vacuum the table top. Even the tiniest particle under the Mat can give the Robot trouble. After vacuuming, carefully run your hand over the surface and sand or file down any protruding imperfections you find. Then vacuum again.

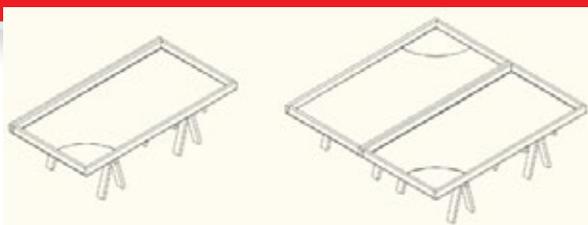
STEP 2 - On the vacuumed surface (never unroll the Mat in an area where it could pick up particles), unroll the Mat so the image is up and its north edge is near the north/double Border Wall (note the location of the double wall in each Table sketch below). **Be very careful to not let the mat kink from bending in two directions at once.**

STEP 3 - The Mat is smaller than the playing surface by design. Slide and align it so that there is no gap between the south edge of the Mat and the south Border Wall, then center the Mat east-west, with equal gaps at left and right.

STEP 4 - With help from others, pull the Mat at opposite ends and massage out any waviness away from the center and re-check the requirement of Step 3. It is expected that some waviness will persist, but that should relax over time. Some teams use a hair dryer to speed the relaxation of the waviness.

STEP 5 - OPTIONAL - To hold the Mat in place, you may use a thin strip of black tape at the east and west ends. Where the tape sticks to the Mat, it may cover the Mat's black border only. Where the tape sticks to the Table, it may stick to the horizontal surface only, and not the Border Walls.

STEP 6 - For a competition setup, Dummy Walls are not needed. Secure two Tables north-to-north. **The total span of Border between two Tables must measure between 3" (76mm) and 4" (100mm).**

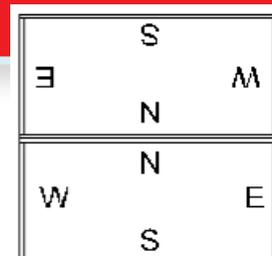


PRACTICE TABLE

TOURNAMENT TABLE



PRACTICE TABLE



TOURNAMENT TABLE

Mission Model Construction

BUILD THE MISSION MODELS

Use the LEGO elements from your Challenge Set, and instructions from [HERE](#). It will take a single person four to five hours to do this, so it's best done in a team construction party. For any team members with little or no experience building with LEGO elements, Mission Model construction is a great way to learn. This step is also a nice time for new team members to get to know each other.

QUALITY - The Models must be built **PERFECTLY**. "Almost perfect" is not good enough. Many teams make several building errors and practice all season with incorrect Models... When these teams later compete on Fields with correct Models, the Robot fails. The team incorrectly blames the Robot, the tournament organizers, or bad luck for the failure. Best practice is to have several people check for correctness. **Please!**

Mission Model Arrangement and Setup

DUAL LOCK - Some Models are "secured" to the Mat, while others are simply "placed" on the Mat. Each place on the Mat where a Model needs to be secured has a box with an "X" in it. The connection is made using the re-usable fastening material from 3M called "Dual Lock," which comes with the LEGO elements in your Challenge Set. Dual Lock is designed to "lock" to itself when two faces of it are pressed together, but you can unlock it too. The application process for the Dual Lock is only needed once. Afterward, the Models can simply be locked onto the Mat or unlocked. To apply Dual Lock, proceed one Model at a time...

STEP 1 - Stick one square, adhesive side down, on each box you see on the Mat with an "X" in it. For half-sized boxes, cut the squares in half.

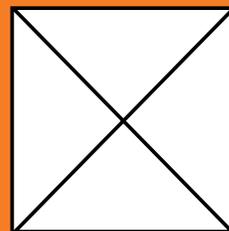
STEP 2 - Press a second square on top of each of those, "locking" them on, adhesive side **up**. **TIP:** Instead of using your finger, use a bit of the wax paper the squares came on.

STEP 3 - Align the Model exactly over its mark, and lower/press it onto the squares.

CAUTION - Pay attention... Some Models which seem symmetrical in fact have a directional feature somewhere.

- Be sure to place each square precisely on its box, and each Model precisely over its marks.
- When pressing a Model down, press down on its lowest solid structure instead of crushing the whole Model. Pull on that same structure if later you need to separate the Model from the Mat.

TIP - For large and/or flexible Models, apply only one or two pairs at a time. There's no need to do it all at once.



STEP 1

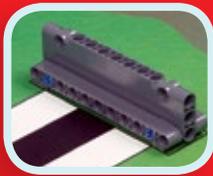


STEP 2



STEP 3

Mission Models (Simple Setups and Definitions)



BARRIERS



HOUSE



FIRETRUCK



PENALTIES



FLOWER



FILTER



PUMP ADDITION



FAUCET



SLINGSHOT



CURBS



RAIN



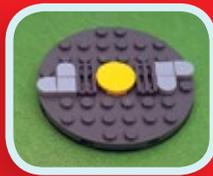
RAIN CLOUD AND RAIN



FOUNTAIN



BASE



MANHOLE COVER
WEST



MANHOLE COVER
EAST



SLUDGE



BROKEN PIPE



TRIPOD TARGETS



WATER WELL TARGET



WATER TARGET



SLINGSHOT TARGET



PIPE CONSTRUCTION TARGET



PUMP ADDITION TARGET

NOTES FOR SIMPLE SETUPS AND TARGETS

BARRIERS: Secure each one with its smooth side facing west. There are six of these.

HOUSE: Secure the model, then lift the fire up, and push the yellow beam under it.

FIRETRUCK: Place loose, carefully parallel with marks. If Firetruck rolls by itself, level the Table enough to stop it.

PENALTIES: Give these to the referee. These are not needed on a practice field.

FLOWER: Secure with flower part down.

FILTER: Secure the model, then lift the lock lever (with a black ball on it), and pull the yellow plunger south to its mark.

PUMP ADDITION: Place loose.

FAUCET: Secure with cup's white/blue part flipped all the way down. Handle spins smooth, with a little resistance.

SLINGSHOT (Water Purifier): Install a Rain and the Dirty Water into the Slingshot, and close its black bar to keep the yellow plunger up. Waters must be flat-side down. Rain or Dirty Water can be installed in either side randomly.

CURBS: Secure Curbs with wedges facing the circles.

RAIN: See SLINGSHOT and RAIN CLOUD AND RAIN.

RAIN CLOUD AND RAIN: Secure with cloud part facing east. Move and hold yellow bar north while evenly spreading 8 Rain into the top. Perfectly even spread is not expected.

FOUNTAIN: Secure with fountain parts down.

BASE: The quarter-circle at southwest is Base. In Base, loosely store the Water Well, Tripod, the Optional Loop, both New Pipes, three Big Waters, and the loaded Slingshot. You may keep all these Models anywhere in Base, or in other approved off-Table storage.

MANHOLE COVERS: Place loose. Either cover can go on east or west mark, and spin is random.

SLUDGE: Place loose on the Water Treatment model per details below.

BROKEN PIPE: Place loose in the Pipe Repair setup per details below.

TRIPOD TARGETS: These large circles only. Either of these two large circles is a valid Tripod target.

WATER WELL TARGET: This large circle only.

WATER TARGET: Place loose. This target is movable during the match within a range described in Mission M16.

SLINGSHOT TARGET: Extends to the east wall. Does not include the barrier.

PIPE CONSTRUCTION TARGET: Extends to the north wall.

PUMP ADDITION TARGET: Extends to the north wall.

Mission Models (Advanced Setups)

STEPS FOR PUMP SYSTEM

STEP 1: Locate Dual Lock pairs exactly and only in the places shown.



PUMP SYSTEM STEP 1

STEP 2: Secure the model to the north Border Wall within its marks.



PUMP SYSTEM STEP 2

STEP 3: Load a Big Water into the model.



PUMP SYSTEM STEP 3



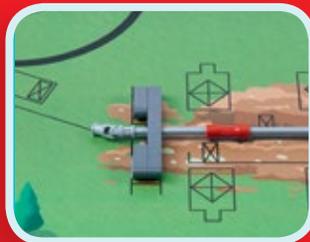
WATER TREATMENT STEP 1



WATER TREATMENT STEP 2



STEP 2 NO RUBBING



WATER TREATMENT STEP 3



WATER TREATMENT STEP 4



WATER TREATMENT STEP 5



WATER TREATMENT STEP 6



WATER TREATMENT STEP 7



STEP 7 RESET AND LOADED

Steps for Water Treatment

STEP 1: Secure the toilet as shown, with the east axle joined to it.

STEP 2: Join the center axle and secure the east bearing, keeping the center axle perfectly above its mark AND so the joiner is not rubbing tightly against the bearing.

STEP 3: Keeping the center axle perfectly above its mark, secure the west bearing.

STEP 4: Secure the two Water Treatment model's guides, then remove them (STEP 4 shows them secured).

STEP 5: Join the west axle and Water Treatment model, and fit the model as

accurately as possible onto its mark.

STEP 6: Secure the guides, allowing the model a LITTLE bit of wiggle room (STEP 6 shows the model set/loaded).

STEP 7: To set the model, lift the white tank while pushing the gray bar west, then load the Sludge and a Big water.

TESTING: Push the Toilet's yellow lever down and hold it there. The push should take very little force, and should cause the Water Treatment model to eject the Big Water and Sludge. If there is binding, re-trace each step carefully.

MISSION MODELS (Advanced Setups)



PIPE REPAIR STEP 1a



PIPE REPAIR STEP 1b



PIPE REPAIR STEP 2



STEP 3



STEP 4

Steps for Pipe Repair

STEP 1a, 1b: Secure the ramps by tilting them up for access. Secure an end pad first, then the remaining three together.

STEP 2: Push the ramps down and apply the Dual Lock for the black pipes if you haven't already.

STEP 3: Without any force, set the black pipes over their marks, but NOT letting them rub the center axle. When you're SURE the black pipes are not rubbing the axle, that's the place to press them down.

STEP 4: Place the Broken Pipe as centered as possible between the ramps and black pipes. Be sure the loop is vertical and parallel to the ramps.

Field Maintenance

- **BORDER WALLS** - Remove any obvious splinters, and cover any obvious holes.
- **FIELD MAT** - Make sure the Mat touches the south Border Wall, and is centered east to west. Avoid cleaning the Mat with anything that will leave a residue. Any residue, sticky or slippery, will affect the Robot's performance compared to a new Mat (many tournaments use new Mats). Use a vacuum and/or damp cloth for dust and debris above and below the Mat. To get marks off, try a white-plastic pencil eraser. When moving the Mat for transport and storage, be sure not to let it bend into a sharp kink point, which could affect the Robot's movement.

Tournaments using new Mats should unroll the Mats as far in advance of the tournament day as possible. For control of extreme curl at the east or west edges of the Mat, black tape is allowed, with a maximum of ¼" (6 mm) overlap. Foam tape is not allowed. Do not put Dual Lock under the Mat, or use it for anything other than securing Mission Models as described.

- **MISSION MODELS** - Keep the Mission Models in original condition by straightening and tightening solid connections often. Ensure that spinning axles spin freely by checking for end-to-end play and replacing any that are bent.





The Robot Game

2017/2018 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 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.

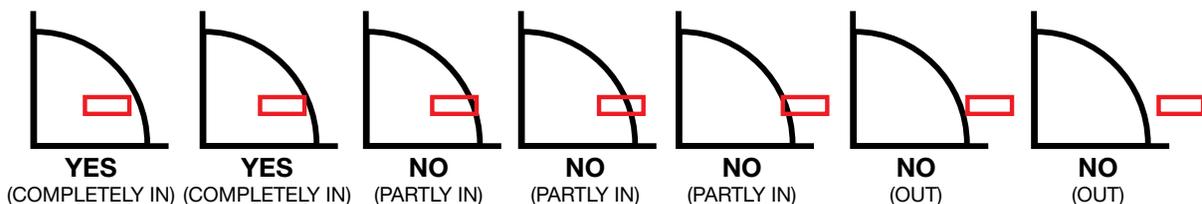
D04 - ROBOT - Your “Robot” is your LEGO MINDSTORMS controller and all the Equipment you’ve combined with it by hand which is not intended to separate from it, except by hand.

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.

Definitions (continued)

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.



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.



EV3



NXT



RCX

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.



EV3 “LARGE”



EV3 “MEDIUM”



NXT



RCX

Equipment, Software and People (continued)

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.

Play (continued)

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.

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**" 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.

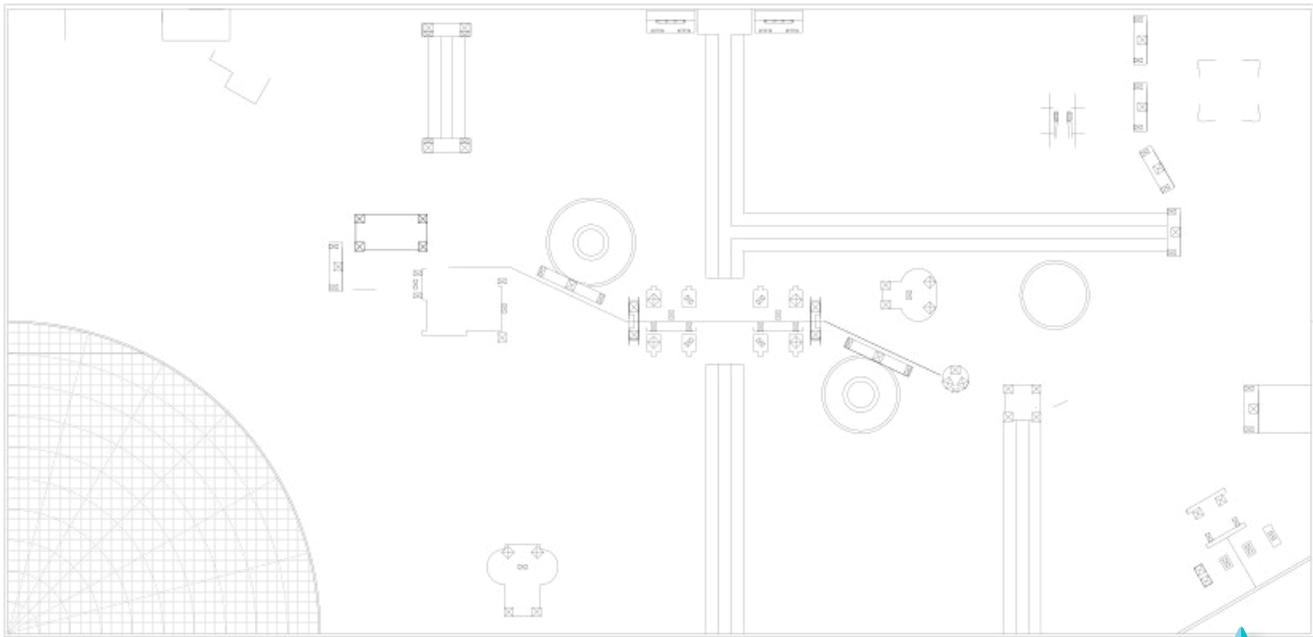
R19 - SCORING

- 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



FOR THE 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



SCORE

M04 - RAIN

Make at least one Rain come out of the Rain Cloud.

20 Points

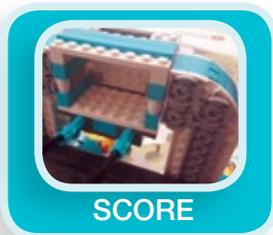


SCORE

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



SCORE

M05 - FILTER

Move the Filter north until the lock latch drops.

30 Points



SCORE

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**



SCORE

M06 - WATER TREATMENT

Make the Water Treatment model eject its Big Water, *only by moving the Toilet's lever.

20 Points



SCORE

2017/2018 Robot Game Missions (continued)

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



2017/2018 Robot Game Missions (continued)

M11 - PIPE CONSTRUCTION (Install the Optional Loop first, in Base, if you wish.) Move a New Pipe so it is

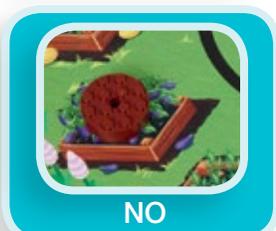
FOR PARTIAL SCORE: partly in its target, in full/flat contact with the mat. **15 Points**

FOR FULL SCORE: completely in its target, in full/flat contact with the mat. **20 Points**



M12 - SLUDGE

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



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**



M15 - FIRE

Make the fire drop *only by making the Firetruck 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**

OFF-LIMITS LINE EXTENDS ALL THE WAY NORTH/SOUTH INCLUDING UNDER RAMP	NO SCORE	SCORE: TWO BIG WATER AND AT LEAST ONE RAIN	NO SCORE	SCORE: AT LEAST ONE RAIN
SCORE: TWO BIG WATER	SCORE: ONE BIG WATER	SCORE: AT LEAST ONE RAIN	SCORE: TWO BIG WATER	

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)**

BONUS ADDED	BONUS ADDED	NO BONUS	NO BONUS

2017/2018 Robot Game Missions (continued)

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