

Q1 Maximum Number of CIMs

Q: In R33, it is stated that permitted motors may be used in any quantity, including CIMs. However, later it is also stated that there would be a maximum of 6 CIMs per robot. Is the maximum still 6 or has it been lifted?

A: There is no maximum number of CIMs per robot. Please see [Team Update 01]
(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate01.pdf>)

(Asked by **6203** at Jan 10th 18)

Q2 Does the Force powerup give ownership or ownership points?

Q: Does the Force powerup give ownership of a switch, scale, or both or ownership points? In section 2 it states, "Force gives the alliance ownership of the Switch, Scale, or both for a limited period of time" and also it suggests something similar in section 4.2, these suggests the that it is ownership and in section 4.3 it states "ALLIANCE earns OWNERSHIP points from their SWITCH regardless of PLATE position" which suggests ownership points.

A: *What* FORCE gives OWNERSHIP for depends on how many POWER CUBES are in the VAULT when it's applied. See Table 4-2. OWNERSHIP of the SWITCH/SCALE/both is rewarded with points per Table 4-1 (regardless of if OWNERSHIP was achieved by manipulating the FIELD element or by applying FORCE).

(Asked by **6823** at Jan 10th 18)

Q3 Manual Typo

Q: On page 21 3.3.2 Rungs In the description, there is an extra "1 ft." listed in the 3rd sentence /quote RUNGS consist of a 1 ft. 1 ft. 1 in. (~33 cm) long 1 ¼ in. Schedule 40... //quote

A: **Edited Jan. 18, 2018** Thank you for letting us know! **This has been fixed.**

(Asked by **5201** at Jan 10th 18)

Q4 R24 clarification

Q: A robot includes a flexible material that extends below everything else on the robot. At some point during a match, the bottom of the flexible material is more than 7 inches below the top of the robot's bumpers. However, if the robot were placed on a flat surface, the flexible material would bend and the lowest point of the robot would be less than 7 inches below the top of the robot's bumpers. Has this robot broken R24?

A: Provided the ROBOT's BUMPERS are within the BUMPER ZONE when the ROBOT is placed normally on a flat floor, then no, R24 is not violated.

(Asked by **3504** at Jan 10th 18)

Q5 randomization of colors and team " sides" of the switches and scale

Q: Are colors of the 2 switches and the scale totally random or are they following a pattern? Examples of pattern: switch 1 RED, Scale RED, switch 2 RED. Another pattern would be RED, BLUE, RED. Etc.

April 28, 2018

A: ****Updated Jan. 18, 2018**** ~~Each SWITCH and SCALE is independently randomized per section 4.1.1~~ As of [Team Update 3](https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate03.pdf) there are four sets of possible PLATE assignments, and each match a set is randomly selected (i.e. there's no pattern to how a set is selected).

(Asked by **4913** at Jan 10th 18)

Q6 Box tubing part of RUNG?

Q: Per the manual 3.3.2, "RUNGS consist of a 1 ft. 1 ft. 1 in. (~33 cm) long 1 ¼ in. Schedule 40 aluminum pipe supported by 2 in. (~5 cm) box tubing." This sentence implies that the box tubing is not part of the RUNG, but it's not entirely clear. Is the box tubing part of the rung? Is it legal for robots to grab/grasp/etc. the box tubing?

A: Yes, the box tubing is part of the RUNG as highlighted in 3.3.2. !G19 specifies how ROBOTS are permitted to interact with the RUNGS.

(Asked by **3504** at Jan 10th 18)

Q7 Is the platform part of the scale for the purposes of climbing?

Q: The rules as written (RAW) list the scale as including the platforms, which would imply that a robot could lift up other robots while remaining on the platform, causing the other robots to be transitively supported by the scale. Is this the case, or do robots need to be unsupported by the platforms to have climbed?

A: Per Table 4-1's definition of CLIMBING, a ROBOT must be "...fully supported by the SCALE (either directly or transitively) ... not in direct contact with their PLATFORM ...". It is possible for a ROBOT to still meet the requirement for CLIMBING, while transitively contacting a PLATFORM, assuming all requirements in Table 4-1 definition are met.

(Asked by **5498** at Jan 10th 18)

Q8 Rule R24 clarification

Q: If a mechanism is deployed while the robot is on the platform and extends to the floor, but does not effect the height of the Bumpers in relation to the plane upon which the robot is supported, but would extend below the horizontal plane upon which the robot is located. If the Bumper height is not altered (the Bumpers have not been lifted as in EX. 2) by the deployment of mechanism, nor will the wheels leave the surface of the platform, has R24 been broken?

A: If a ROBOT's BUMPERS are outside the BUMPER ZONE when it's placed on a flat floor (think, single plane), then yes, !R24 is violated. !R24 does not accommodate multiple flat floors at various altitudes.

(Asked by **6886** at Jan 10th 18)

Q9 Autonomous Line Crossing

Q: When we cross the line once in autonomous, can we come back across the line and still get the point. As in if I did a scale autonomous and drove back to the exchange after would it count for the Ranking Point or do you have to be passed the line when autonomous ends.

April 28, 2018

A: Per Table 4-1: AUTO-RUN is granted "For each ROBOT that breaks the vertical plane of the AUTO LINE with its BUMPER at any point in the AUTO stage". There is no requirement that you continue to break the line, or be breaking the line at T0.

(Asked by **453** at Jan 10th 18)

Q10 Is a ramp similar to 2007 legal for climbs?

Q: If i made a robot with a deployable ramp for the last 30 seconds of play. Assuming both of my team mates were able to drive up fully and their bumpers were above 12 inches. And also given that they are being supported by me who is fully supported by the platform if the scale, and they are transitively supported by the scale by being supported by me.

A: We can't respond here because there isn't an actual question in the "question" field and title, while a question, is overly vague. Please review [Section 1.8]
(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) for information about how to formulate a question that helps us provide a helpful answer.

(Asked by **453** at Jan 10th 18)

Q11 Three Robot Climb on 13 Inches of Space?

Q: Are the robots limited to the 13 inch rung for climbing? Or are they allowed to climb into the sides?

A: Please review !G19 for details about what your ROBOT may interact with. If you're still unsure of what FIELD elements your ROBOT can/can't grab, please submit another question and consider citing those field elements about which the manual is unclear specifically.

(Asked by **3525** at Jan 10th 18)

Q12 OWNERSHIP and fractional seconds

Q: The blue box beneath Table 4-1 has a good example illustrating how OWNERSHIP points accumulate using integer second counts, but it's not totally clear how scoring works in terms of fractional seconds. Specifically: 1. If OWNERSHIP of the SWITCH is established at 4.5 seconds into TELEOP (after the 1-second debounce), is 1 point awarded at 4.5 seconds, then again at 5.5, 6.5, etc? 2. Assuming yes, if the BOOST POWER UP is played at 6.4 seconds, are 2 points awarded at 6.5 seconds, then 7.5, etc?

A: Yes and yes. Recall per [Section 4.2]
(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284553) that a SWITCH or SCALE must be "... tilted in favor of their ALLIANCE colored PLATE..." for at least one (1) second before OWNERSHIP is established. If the PLATE tilted to meet the required distance at 3.5 seconds into TELEOP, such that OWNERSHIP was established at 4.5 seconds (per your example), then what you describe is correct, as long as the requirements continued to be met.

(Asked by **254** at Jan 11th 18)

Q13 Bumper Rule 23 clarification

Q: The manual states, "R23. ROBOTS are required to use BUMPERS to protect all outside corners of the FRAME PERIMETER. For adequate protection, at least 6 in. (~16 cm) of BUMPER must be placed on each side of each outside corner (see Figure 8-2). If a FRAME PERIMETER side is shorter than 6 in. (~16 cm), that entire side must be protected by BUMPER. Does "adequate protection, at least 6 in" mean that it is best practice or hard-fast rule or can we have 4 inches if completely covered by a bumper??

A: It's a hard-fast rule.

(Asked by **4056** at Jan 10th 18)

Q14 Use of Linear Actuators

Q: We wish to use linear actuators, such as ServoCity's 8" Stroke Heavy duty 180 pound linear actuator. We would like to know if these are legal to use?

A: Please see [Section 1.8]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526).

The purpose of the Q&A is not to "bless" specific parts, but instead help teams understand the rules as written.

The final decision as to legality of a particular part or design lies with the Lead ROBOT Inspector (LRI) at each event. If you have a question about a specific rule, please rephrase and resubmit.

(Asked by **4056** at Jan 11th 18)

Q15 Starting Configuration R02 VS Robot Frame Extension R04

Q: When reading R02, it states that the Starting Configuration shall not extend outside of the Vertical Projection of the Frame and if you read in the blue box below if you put the robot up against a wall only the frame perimeter shall hit the wall meaning no horizontal projection. But in R04, it states you may not extend more than 16in past the frame perimeter. Is vertical upwards? and saying that could a person have a arm that in the starting configuration be outside of the frame perimeter?

A: Yes, vertical means "upwards". !R02 describes restrictions in the STARTING CONFIGURATION (see !G01). !R04 describes restrictions on ROBOT sizing for the rest of the match (with the exception of the ENDGAME per !G05)

(Asked by **6732** at Jan 10th 18)

Q17 Fully Supported by Scale

Q: Is the Platform part of the Scale? IF so Could a person lift themselves 12 inches off the platform and still be considered as a climb without touching the Rung? It is stated that a Climb is when Each Robot is fully supported by the Scale with the Bumpers are fully above Bricks at T=0 and not at all in the opponents Platform Zone.

A: 1. Yes, please see the definition of SCALE. 2. People aren't allowed on the FIELD during the MATCH, so no.

(Asked by **6732** at Jan 11th 18)

Q18 platform zone

Q: For the purpose of a climb, is the carpeted area of the platform zone considered part of the scale?

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A: No. Per 3.3: "The SCALE features an arm, RUNGS, PLATES, OUTRIGGERS, PLATFORMS, and TOWER"

(Asked by **1051** at Jan 10th 18)

Q19 autonomous line crossing

Q: To get the points in autonomous, does the entire robot have to cross the auto line, or only the leading edge of its bumper?

A: Per Table 4-1: "For each ROBOT that breaks the vertical plane of the AUTO LINE with its BUMPER at any point in the AUTO stage". Any part of the BUMPER has to break the vertical plane of the line.

(Asked by **1051** at Jan 10th 18)

Q20 Does playing a LEVITATE get you 30 points?

Q: Section 4.2 lists out the qualifications for CLIMBING and FACE THE BOSS. CLIMBING which gets you 30 points does not mention LEVITATE, while FACE THE BOSS explicitly mentions "All three (3) ALLIANCE ROBOTS have CLIMBED or two (2) ROBOTS have CLIMBED and the ALLIANCE has played the LEVITATE POWER UP" So does an alliance earn the extra 30 points for playing the LEVITATE POWER UP?

A: Per Table 4-2, LEVITATE gives "An additional CLIMBING ROBOT, up to a maximum of three (3) ROBOTS..." Per Table 4-1, a CLIMBING ROBOT is worth 30 points. So, it depends on how many ROBOTS are CLIMBING (i.e. if three (3) have CLIMBED, LEVITATE is moot).

(Asked by **2834** at Jan 11th 18)

Q21 Multi Robot Climb

Q: When climbing can a single robot carry one or two other robots either on top of or on the sides of there robot legally?

A: IG17 is the only rule that governs if/when a ROBOT can fully support another ROBOT (or ROBOTS).

(Asked by **2667** at Jan 11th 18)

Q22 A02 Blue box section it says "...Teams can use the information from the FMS to determine

Q: A02 Blue box section it says "...Teams can use the information from the FMS to determine PLATE color assignments using preprogrammed instructions (see section 3.10)." Specifically when during the pre-match will that information be sent to the DS?

A: Data is sent to the ROBOTS as part of the MATCH start process, after DRIVE TEAMS are behind the line and the "3...2...1...go! announcement" by the emcee. The AUTO stage begins shortly thereafter, once the lights on the PLATES have finished their animation.

(Asked by **2073** at Jan 10th 18)

April 28, 2018

Q23 R03 Starting configuration When during the game ...

Q: R03 Starting configuration When during the game, and where in the Arcade, is the robot allowed to exceed the Starting configuration maximum height of 55 inches?

A: After the MATCH has started, there are no rules limiting ROBOT height. That being said, please consider !G05's blue box regarding the venue restrictions, as well as !S01 regarding safety and legality throughout the event.

(Asked by **2073** at Jan 11th 18)

Q24 R24 Bumpers Does this rule prevent a robot, during the Endgame, from using a mechanism to

Q: R24 Bumpers Does this rule prevent a robot, during the Endgame, from using a mechanism to press against the platform and thus lift the robot and its bumpers above the top of the bricks?

A: Table 4-1 in Section 4.2 requires a ROBOT to not be in direct contact with their PLATFORM before it would be considered CLIMBING. This was clarified in [Team Update 1]
(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate01.pdf>)

(Asked by **2073** at Jan 11th 18)

Q25 No minimum firmware requirements this year?

Q: The manual this year doesn't list a minimum firmware requirement for the roboRIO or any CAN devices, as it has in previous years. Is this requirement being removed or should we expect to to be added in a team update?

A: Please see !R63, which lists the minimum firmware requirement for the roboRIO. Minimum firmware requirements for CAN Devices are not specified in the Game Manual as the minimum firmware required to be compatible with the software is sufficient.

(Asked by **2191** at Jan 10th 18)

Q26 Can an alliance play both FORCE and BOOST powerups simultaneously?

Q: § 4.3 and Fig 4-2 make clear on what happens when an alliance attempts to play a POWER UP during the opponent's POWER UP time? But it is unclear on what happens if an alliance were to load a cube into each of their FORCE and BOOST columns and then hit both buttons in rapid succession. a) would both FORCE and BOOST take effect? b) would BOOST go into a queue until after FORCE finished—effectively denying the other side 20 seconds of POWER UP time? c) or would the Boost button have no affect?

A: Good question! See [Team Update 2]
(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate02.pdf>).

(Asked by **2834** at Jan 13th 18)

Q28 AndyMark chassis upgrades

Q: If a 4 wheel upgrade for the kit of parts chassis exceeds \$500 is it legal for use? Planning on upgrading AM14U3 KoP chassis to 6" mechanum wheels(am-14u3-MK6SR). As sold by AndyMark.

A: Per the Blue Box affiliated with !R12, "If a COTS item is part of a modular system that can be assembled in several possible configurations, then each individual module must fit within the price constraints defined in !R12." While we won't rule/comment on specific items, if the item(s) can be used in a variety of configurations, their individual fair market values can be included in the CAW vs. their collective fair market value.

(Asked by **5746** at Jan 11th 18)

Q29 Pool Noodle Size

Q: Rule book states "use a stacked pair of approximately 2½ in. (nominal) round, petal, or hex "pool noodles" (solid or hollow) as the BUMPER cushion material", approximately and nominal are a little vague. How much variance is given in the size of pool noodles. 2 1/2 inch are hard to find, while noodles that are 2 - 2 1/4 are easy to find.

A: A "nominal" dimension is a dimension by which a product is marketed or sold but which may not match the actual dimension. No specific measurement variance is, or will be, specified.

(Asked by **4809** at Jan 11th 18)

Q30 Reflective Vision Tape attached to Human Player Leg

Q: Under H07, would a Human Player be allowed to wear Reflective Vision Tape attached to their pants leg if it is cut so it does not resemble the vision tracking target used on the Switch?

A: While we cannot rule absolutely on whether a proposed item "mimics the Vision Targets used on the FIELD", generally an item that is the same material as, but a distinctly different shape than, the Vision Targets would not be a violation of !H07.

(Asked by **2846** at Jan 11th 18)

Q31 In the game manual, it states.....?

Q: In the game manual, it states that we can put contact on another robot for 5 seconds. Therefore my question is can we push another robot into there power cube zone for 5 seconds?

A: We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8]
(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

(Asked by **1880** at Jan 11th 18)

Q32 Bumper Mounting Brackets

Q: Can bumper mounting brackets extend horizontally into a gap between two bumper segments?

A: Please see the Blue Box beneath !R29 and !R30-G regarding determination of whether a mounting component is part of the BUMPER or ROBOT. Significant deviation from the BUMPER cross-section shown in Figure 8-6, except as allowed per !R31, is not permitted.

(Asked by **2846** at Jan 11th 18)

Q33 levitated robots

Q: If a robot is able to drop a ramp and let another robot climb up on them. Is the robot that's letting them climb up on them considered levitated if their wheels are still on the ground?

A: We're unsure what you are asking. LEVITATE is a POWER UP described in Section 4.3. that gives an ALLIANCE one extra CLIMB up to a maximum of three. A ROBOT does not need to be in a specific position to be credited with a CLIMB because LEVITATE was played. If this does not answer your question, please rephrase and resubmit, referencing specific rules or sections in the manual if possible.

(Asked by **1880** at Jan 11th 18)

Q34 Climb Scoring

Q: The definition of a valid climb states that the robot must be above the BRICKS at T=0. If a robot meets this requirement but then begins to fall after T=0 until it is below the BRICKS, will it be counted? Is it assured that the measurement of a climb will be taken at T=0?

A: As you said, the definition of CLIMBING is in relation to TELEOP T0, therefore if a ROBOT were to "fall" after T0, it wouldn't impact CLIMBING. That being said, it's in your best interest to make it clear to a REFEREE who must make an assessment at T0 that your BUMPERS are fully above the BRICKS.

(Asked by **5803** at Jan 11th 18)

Q35 Bumpers During ENDGAME

Q: During the ENDGAME, what portion of the ROBOT must be above the 12" mark? Is it the bottom of the bot or the bottom of the BUMPERS?

A: Per the definition of CLIMBING in Table 4-1: "For each ROBOT fully supported by the SCALE (either directly or transitively) with ****BUMPERS**** fully ..." (bolded for clarity). BUMPERS refers to all of your BUMPERS.

(Asked by **3242** at Jan 11th 18)

Q38 How Much Will It Take to Move the SWITCH/SCALE?

Q: How much weight, or rather how many POWER CUBES, does it take on average does it take to make the SCALE or SWITCH move from the starting position?

A: For a SWITCH or SCALE that otherwise has no POWER CUBES on it, a single POWER CUBE placed anywhere on one of the PLATES will move it from the starting (balanced) position.

(Asked by **3242** at Jan 11th 18)

Q39 Additional R24 Clarification

Q: In answering Q4, you state that a robot can have flexible materials extend downward farther than 7 inches below the top of the bumpers as long as those materials would be within 7 inches when the robot is placed normally on a flat floor. In the blue box below R24, you state "This measurement is intended to be made as if the ROBOT is resting on a flat floor (without changing the ROBOT configuration)." What constitutes a change in robot configuration (if not the bending of a flexible material)?

A: If the ROBOT is purposefully readjusted, realigned, compressed, moved, etc., it's considered having had its configuration changed. If no purposeful attempt is made to alter the ROBOT in moving it to its flat floor (i.e. people are only moving it), then no reconfiguration has happened.

(Asked by **3504** at Jan 12th 18)

Q41 Ramp legality for climbing

Q: I posted this earlier but i am rephrasing my question for clarity. Assuming a robot is parked on the platform, and two other robots are on top of that robot who is fully supported by the scale by being on the platform. Also assuming that at T=0 both of the upper robots bumpers are above the 12 inches on the scale, is this considered a legal climb? And if this this is considered a legal climb is this due to the fact that the robots are not in direct contact with the platform but are transitively?

A: We believe !Q7 answers your question. If it does not, please rephrase and resubmit.

(Asked by **453** at Jan 11th 18)

Q42 If an alliance partner doesn't show up for a match, is it still possible to levitate them?

Q: According to table 4-2, the effect of force is stated as "An additional CLIMBING ROBOT, up to a maximum of three (3) ROBOTS, is credited to the ALLIANCE at the end of the MATCH". Does the maximum of three robots include robots that may have no shown up for a match?

A: The "maximum of three (3) ROBOTS" has no consideration for how many ROBOTS on a particular ALLIANCE were present. It is possible for LEVITATE to be applied to a ROBOT who wasn't present (or was BYPASSED) in the MATCH (per the procedure in 4-3).

(Asked by **694** at Jan 11th 18)

Q43 "G05" Clarification. Robot Perimeter?

Q: In rule G05 it shows robot frame perimeter. Does this frame perimeter include the vertical height of the robot? If not, can you still extend greater than 16 inches because the height of the scale is 72 inches not including the lexan wall.

A: FRAME PERIMETER is a horizontal projection and has no bearing on ROBOT height. You may also find the answer to !Q23 helpful.

(Asked by **6722** at Jan 11th 18)

Q45 Does a robot have to be on the platform zone to be able to earn climb through levitate?

Q: If a robot is not in the platform zone (and has not/ can't climb) when the game ends, levitate has been activated, and all other alliance robots have made the climb, will the robot that is not on the platform zone receive the 30 climb points?

A: ****Edited Jan. 18, 2018**** ****The answer to the question in the title is "no."** The answer to the question in the body of this post is **** Yes. LEVITATE does not require the ROBOT to be in any particular area of the FIELD (or even present on the FIELD) to be counted as CLIMBING.**

(Asked by **2543** at Jan 11th 18)

Q46 Torsional moment on the rung structure

Q: A torsional moment will occur when one robot is hanging at the center of the rung and a second robot is hanging on an outrigger provided by the first robot. This moment could be anticipated to be approximately 400 ft lbs. Can the rung structure support this condition?

A: The SCALE was designed to withstand rigorous game play, including multiple heavy objects hanging in various positions. However, if a team feels that their particular ROBOT design may damage FIELD components, they are encouraged to prototype and test in order to avoid violating !G19.

(Asked by **2457** at Jan 11th 18)

Q47 Force applied to bricks when climbing

Q: When climbing the center of gravity of the robot is anticipated to be beyond the 8 1/4" distance from the tile to the center of the rung. It is anticipated that there will be approximately 45 lbs horizontal force with the bumpers rubbing on the bricks during the lift. Is this force applied by bumpers or wheels to the bricks and supporting structure acceptable? The concern is due to a possible violation of rule G19 (Damaging field pieces).

A: Thank you for caring! FIELD elements were designed anticipating ROBOT contact and force as described. That being said, we cannot rule absolutely on hypothetical CLIMBING MECHANISMS, and ROBOTS must be careful not to damage the TOWER of the SCALE through other means while CLIMBING, such as an extension beyond the FRAME PERIMETER.

(Asked by **2457** at Jan 11th 18)

Q49 R04 Robots may not extend

Q: In R04, it states you may not extend more than 16in past the frame perimeter. Is this measurement starting at the maximum size stated in R03 of 33in by 28in by 55in. or by the height of our existing robot.

A: The ROBOT's FRAME PERIMETER is whatever the team designs it to be, it just cannot exceed the dimensions specified in !R03. Once the FRAME PERIMETER is solidified, that defines the boundary beyond

which the extension can reach per !G05. Please see !Q23 for your question about the ROBOT height.

(Asked by **5420** at Jan 11th 18)

Q50 Transportation crate size limits for international teams

Q: What crate size limits will apply for international teams shipping their robots to USa this year? Will fully assembled 55 inch high robot fit in the crate?

A: Good question. The [2018 Shipping Crate Construction] (https://firstfrc.blob.core.windows.net/frc2018/2018_Shipping_Crate_Construction.pdf) document has been posted (and announced in [Team Update 2] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate01.pdf>)).

(Asked by **6996** at Jan 13th 18)

Q51 When you want to place a power cube

Q: When you want to place a power cube into the switch do we have to be against the glass to place it, or can we be a foot back and "toss" it in?

A: We think you may be interested in !G09 regarding where on the FIELD it is okay to "launch" a POWER CUBE. If that doesn't answer your question, please resubmit a more specific question quoting the rule(s) you're interested in.

(Asked by **1880** at Jan 11th 18)

Q52 Use of Electro Magnets

Q: Is it allowed to use electromagnets in the upcoming FRC competition? Our team has a specific mechanism in mind that involves the electromagnet holding something in place and releasing it. If it is an actuator and falls under r33, does it fall under the constraints of a solenoid?

A: An electromagnet is not listed in !R33 and therefore is not a legal actuator. An electric solenoid actuator is an assembly consisting of a rod and coil and is distinct from an electromagnet.

(Asked by **4904** at Jan 11th 18)

Q53 What is meant in rule G09 about launching?

Q: 1. In rule G09, what is the definition of launching? Does this mean when a power cube separates from the robot, it is moving in an upward trajectory? Or does launching refer to any and all releasing of a power cube by a robot?

A: There is no _FIRST_ Robotics Competition specific definition of launching. Per the Blue Box below !G22, examples of launching could be "shooting POWER CUBES into the air, kicking across the floor, or throwing in a forceful way".

(Asked by **663** at Jan 11th 18)

Q54 G24 Stop you from storing cubes in switch?

Q: G24 says POWER CUBES stay on PLATES. Strategies aimed at removing POWER CUBES from PLATES are prohibited. Does this prevent you from placing a cube on the switch and then later placing it on scale.

A: Yes. Using PLATES as a temporary storage location for POWER CUBES would be considered a strategy that would violate !G24

(Asked by **5508** at Jan 11th 18)

Q55 Does rule G09 imply a difference between launching and non-launching robots?

Q: Rule G09 indicates a robot may only launch a power cube into the scale from its NULL Territory. Does this imply there is a difference between a launching robot and a non-launching (i.e. dumping) robot? Would a robot with something other than a launching mechanism be allowed to place power cubes into the scale, without being in its null territory? Is it ever acceptable to place power cubes into the scale from a side of the scale that does not border scale on the null territory side?

A: !G09 is evaluating the way in which a ROBOT delivers a POWER CUBE to a PLATE, not the construction of a ROBOT. An individual ROBOT could, theoretically, launch a POWER CUBE onto a PLATE in one portion of the MATCH, and deliver a POWER CUBE to a PLATE without launching in another scenario. There is no requirement that you "launch" POWER CUBES to a PLATE, or that you be in the NULL TERRITORY in order to deliver a POWER CUBE to a PLATE. There are no rules prohibiting the delivery of a POWER CUBE to a PLATE from the "side of the SCALE" as long as it was not launched.

(Asked by **663** at Jan 11th 18)

Q56 Herding vs. Nudging During Cube Placement

Q: G22 prohibits controlling more than one cube, and describes the prohibited act of HERDING vs. the allowed act of NUDGING (of a cube on the plate.) Can you further clarify what kind/extent of movement of a cube already on the plate is allowed? For example, if while Cube A is being placed on the plate it displaces Cube B (which is already scored on the plate) by pushing it back, is that NUDGING or HERDING?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. That being said, if a POWER CUBE was to move while attempting to place another POWER CUBE on your ALLIANCE'S PLATE, the POWER CUBE that was already on the PLATE has been 'nudged'.

(Asked by **1986** at Jan 11th 18)

Q57 What is short launching?

Q: Rule G09 indicates robots may launch power cubes into the scale, provided that the launching is short. How short is short? Are robots permitted to launch any distance from its null territory, as long as the power cube does not go past the scale plate?

A: The headline on !G09 is just a summary of the rule. !G09 A, B and C define what the acceptable locations and

conditions are for launching. If this doesn't answer your question, please resubmit with a more specific question, using glossary terms as necessary.

(Asked by **663** at Jan 11th 18)

Q58 Plate Materials

Q: What is the material on the bottom of the plates on the scale?

A: The purpose of this Q&A is to answer questions regarding the rules of FIRST POWER UP. Any measurements or materials information can be derived from the Field Drawings available at:

[<http://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>]

(<http://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>)

(Asked by **753** at Jan 11th 18)

Q59 Ranking Points in Elimination Rounds

Q: During elimination rounds, what is the point value of a ranking point gained from either the auto quest or defeating the boss?

A: During playoff MATCHES, there are no point values gained from either AUTO QUEST or FACE THE BOSS actions. Please see the paragraph immediately preceding Table 4-1 in section 4.2 of the manual.

(Asked by **753** at Jan 11th 18)

Q60 Post-Placement Manipulation of Cubes

Q: Per Rule G24, the complete removal of placed Power Cubes is illegal, but does this rule also cover post placement manipulation of the Power Cubes? E.g. a robot places a cube but later in the match manipulates the placement of said cube without fully removing it from the Plate.

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. That being said, assuming a ROBOT was compliant with !G22, bumping a POWER CUBE that has previously been placed on your ALLIANCE'S PLATE does not in itself violate !G24, but does put the ROBOT at great risk of an inadvertent violation.

(Asked by **2410** at Jan 11th 18)

Q61 Layered Bumper Fabric

Q: Per Rules R27 and R30, bumpers are permitted to have layered fabric to ensure "each robot is able to display Red or Blue Bumpers to match their Alliance color", however, do the multiple layers of cloth have to be of the same material? If one were to layer (whether by sewing or adhesive) a slicker fabric (such as 200 Denier Nylon) on top of a thicker, more durable fabric (such as Cordura Duck fabric) of the same color, would this custom multi-layer fabric be a legal construction for R30 D?

A: No, using 2 layers of cloth (regardless of whether they are the same or different materials) of the same color is not "needed to accommodate !R27" as either layer would accommodate !R27 on its own.

(Asked by **2410** at Jan 11th 18)

Q62 Can a ROBOT interact with the upward facing surface of the OUTRIGGER?

Q: Is it legal for a ROBOT to interact with the upward facing surface of the OUTRIGGER so long as it is not performing one of the actions in G19 A-G? If a robot is partially supported by the upward facing surface of the OUTRIGGER, is that considered hanging under G19.D? If a robot is fully supported by the upward facing surface of the OUTRIGGER, is that considered hanging under G19.D?

A: 1. Yes. 2 and 3. It depends; there are ways to be supported (partially and/or fully) and also hang from the OUTRIGGERS (violating !G19, part D) and ways to be supported and *not* hang from the OUTRIGGERS. A ROBOT is considered "hanging," per !G19, from a FIELD element if its center of gravity is at or below its support point(s) by that element as judged during a MATCH by a REFEREE.

(Asked by **6357** at Jan 11th 18)

Q63 H07 May the drive team place an ArUco marker behind the glass above the Exchange port?

Q: May the drive team place an Aruco marker behind the glass above the Exchange Return port? This does not mimic or replicate any targeting device on the field.

A: Good question. See !H07 as updated in [Team Update 02] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate02.pdf>). While we won't rule on legality of specific items or their application, we think this answers your question. If not, please rephrase and resubmit.

(Asked by **2073** at Jan 13th 18)

Q64 Pneumatics definitions

Q: What is the official FIRST definition of a pneumatic cylinder, pneumatic actuator, and pneumatic storage tank? Does this definition require any part of the given component to be rigid in structure?

A: There is no *FIRST* Robotics Competition specific definition of the elements you list. Generally, the item's identity is defined and specified by the VENDOR.

(Asked by **3501** at Jan 11th 18)

Q65 Clarifying answers to Q7 and Q17

Q: Is it possible for a robot to have a component push them up from the platform (if the platform is part of the scale and robot is fully supported by it) while still being in contact with the platform but the bumpers are above the yellow bricks, and be considered levitated?

A: We cannot rule absolutely on hypothetical ROBOT designs. Per the definition of CLIMBING in Table 4-1: ROBOTS that are considered to have earned a CLIMB are "not in direct contact with their PLATFORM." Please also consider !R24. Using LEVITATE does not require the ROBOT to be in any particular area of the FIELD (or

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even present on the FIELD) to be counted as CLIMBING.

(Asked by **5060** at Jan 11th 18)

Q66 Height of the rung

Q: The rule book says the rung is 7 ft from the carpet. Is the rung 6ft 8.5 in above the platform. Per the manual 3.3.2

A: Section 3.3.2 specifies the height of the RUNG. To derive the dimension you are inquiring about please refer to the FIELD drawings. Field Drawings available at: <http://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>

(Asked by **5227** at Jan 11th 18)

Q67 feeding cube to human player (more than needed for the vault)

Q: If an alliance has completely filled the vault with 9 cubes, can they continue to feed cube to the human player via the exchange, and have the human player hold and gather boxes? essentially reducing the amount of cube on the actual field by giving them to you human player to hold?

A: There are no rules that dictate the number of POWER CUBES that may be delivered to the EXCHANGE.

(Asked by **1880** at Jan 11th 18)

Q69 Game Specific FMS Data Availability for A02 & Section 3.10

Q: We plan to use the method provided by FMS to get the game specific data (as described in the article "2018 Game Data Details"). If the code queries the FMS before the current match's data is available (available timing described in the same article), will the result be a null value, and empty String, or the prior match's data?

A: Good question! The [2018 Game Data Details] (http://Wpilb.screenstepslive.com/s/currentCS/m/getting_started/l/826278-2018-game-data-details) article has been updated with additional information about initial states and behavior.

(Asked by **1885** at Jan 17th 18)

Q70 Clarification on QA 8

Q: Please clarify the wording of the answer provided in QA 8. The answer given states that "if a ROBOT's BUMPERS are outside the BUMPER ZONE when it's placed on a flat floor (think, single plane), then yes, R24 is violated. R24 does not accommodate multiple flat floors at various altitudes." What is the meaning of the phrase "does not accommodate"? Is the situation in question within the scope of R24? Is the situation provided in violation of R24 or not?

A: !Q8 poses a hypothetical with insufficient information to rule definitively. The phrase "does not accommodate multiple flat floors at various altitudes" means that !R24 refers to a single "flat floor". If the entire ROBOT is not currently resting on a single "flat floor" than the virtual transposition test is used to assess !R24 compliance. The answer to !Q39 may also address your query.

(Asked by **6844** at Jan 11th 18)

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Q71 Is a POWER CUBE from the PILE fair game if any part of it is across the tape?

Q: Rule G23 states "A POWER CUBE has been removed from the POWER CUBE ZONE when it starts fully contained by the POWER CUBE ZONE, and ends completely outside of the POWER CUBE ZONE" And the definition of POWER CUBE ZONE says it includes the gaffer tape" Does this imply that if an alliance causes any part of a power cube to move outside the tape surrounding their zone that an opposing robot could legally snipe it?

A: Correct. In this scenario, the opposing ROBOT would not be in violation of !G23.

(Asked by **2834** at Jan 11th 18)

Q72 Vault and Levitate

Q: Per table 4-2, "an additional climbing robot, up to a max of three robots." Just need some help understanding being able to levitate up to 3 robots. If we fill the levitate column in the vault for 1 robot, does it get emptied in order to fill it up for a 2nd robot? And again if we want to levitate a 3rd robot? Does this mean we can levitate 3 robots for our alliance?

A: No, per Section 4.3, "...an ALLIANCE may only play each POWER UP one time in the MATCH," meaning it is only possible for a single ROBOT per ALLIANCE to LEVITATE. Additionally, per !H14, POWER CUBES may not be removed from the VAULT. The clause in table 4-2 is indicating the maximum number of robots that may be granted a CLIMB for an alliance (i.e. if three (3) have CLIMBED, LEVITATE is moot).

(Asked by **6628** at Jan 11th 18)

Q73 Can you add more POWER CUBES into the POWER CUBE ZONE?

Q: Would Rule G23 still apply to a POWER CUBE moved from a different starting location in the ARCADE to a spot completely in their alliances' POWER CUBE ZONE?

A: Yes, !G23 applies to any POWER CUBE which "starts fully contained by the POWER CUBE ZONE", regardless of how it got there.

(Asked by **2834** at Jan 11th 18)

Q74 Manipulating Cubes on Plates

Q: Can you clarify your answer to Q56? Is there a limit to the number of cubes "nudged" in a single attempt to place a cube that would be in violation of G22.

A: There is no restriction on the number of POWER CUBES that may be "Nudged" while placing a POWER CUBE on a PLATE.

(Asked by **620** at Jan 12th 18)

Q75 Cube Manipulation

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Q: Can you please clarify your answer to Q60? Is your robot permitted to directly manipulate the position of cubes on either yours or the opposing alliances plates provided the cubes are not removed or knocked off per G24? Note G22.H concerning "nudging" DOES NOT address this question as the direct manipulation is not done "while attempting to place additional POWER CUBES on that PLATE."

A: There are no rules explicitly prohibiting manipulation of POWER CUBES on any PLATE. If this manipulation is not done in a way that meets the definition of "Nudging" it would likely be considered "Herding" and thus considered control for the purposes of !G22. Additionally, any POWER CUBES removed from the PLATE may be subject to !G24 and any direct manipulation of the PLATE may violate !G25.

(Asked by **620** at Jan 11th 18)

Q76 Cubes through the Exchange

Q: Can a robot attempting to deposit a powercube into the exchange push another power cube that is partially in the Exchange through without violating G22.B? Said another way, at what point is the powercube in the Exchange opening no longer subject to G22.b, all the way through, half way through, or just breaking the plane of the Exchange-Field interface?

A: Regardless of location, a ROBOT may only herd (per !G22) a single POWER CUBE at a time. If a ROBOT is pushing two POWER CUBES to a desired location, even though the contact with one of the CUBES is transitive, they are in violation of !G22.

(Asked by **620** at Jan 11th 18)

Q77 Switch limits of movement

Q: Paragraph 3.4.1 states "If the outside edge of an ALLIANCE colored PLATE is positioned between 6 in (~15 cm) and 15 in. (~38 cm) above the FIELD carpet then neither ALLIANCE has OWNERSHIP of the SWITCH. Should the 15 in figure in that text rather be 12 in to be consistent with Figure 3-14? If not can you please clarify?

A: **Updated Jan. 19, 2018** No, the text is correct. The text describes the span of PLATE heights from when the scale starts back toward "balanced" to when the ALLIANCE colored PLATE is all the way up. ~~The 12 in. dimension in~~ Figure 3-14 ~~shows the height of the PLATE when the SWITCH is level.~~ **has been updated as of [Team Update 4](<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate04.pdf>) to remove the ambiguous dimensions.**

(Asked by **620** at Jan 12th 18)

Q78 G22 and Q56, Nudging clarification

Q: We'd appreciate clarification on the definition of Nudging (G22H) vs. Herding (G22B). If a robot placing a cube on their alliance's scale plate, strategically uses that cube to push a previously placed cube back the full width of a cube, would that be considered Nudging or a violation of G22?

A: Given that the described ROBOT is "attempting to place additional POWER CUBES on that PLATE" while it makes "contact with a POWER CUBE that is on a PLATE", that would meet the definition of "Nudging".

(Asked by **4488** at Jan 15th 18)

Q79 G11 Initiating deliberate contact within a robot frame perimeter

Q: In the main portion of the rule G11 the words "opponent ROBOT" are used, however in the blue clarification box, it states that a robot "may be penalized under G11 if it appears they are using that element to purposefully contact ANOTHER ROBOT". Does this rule mean that robots cannot breach the frame perimeter of an alliance robot during the endgame of climbing?

A: No. The language in the Blue Box elaborates on the rule text, which is specific about the prohibited contact being with opponent ROBOTS.

(Asked by **3661** at Jan 12th 18)

Q80 Use of Linear Actuators

Q: According to R33. The only motors and actuators permitted on 2018 ROBOTS include the following (in any quantity). Since linear actuators already have a motor attached to drive the lead screw rod, does the use of a linear actuator violate R33?

A: Yes, a linear actuator containing a motor not listed in !R33 is prohibited.

(Asked by **4056** at Jan 11th 18)

Q81 In TE-18007, is the rung providing 14" for climbing?

Q: According to TE-18007, the width given to the rung is greater than that listed in the catalog or shown in the Official Field Drawings. Additionally, there are discrepancies between the numbering of the subsheets for TE-18007 and 18008, and the numbering of parts on the main assembly sheets. Thank you!

A: Thank you for your question, and our apologies for the discrepancies. We think [Team Update 2] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate02.pdf>) answers your questions. If not, please resubmit.

(Asked by **2869** at Jan 13th 18)

Q82 Loaded cube in starting configuration

Q: Does the cube loaded in starting configuration have to be contained within the robot frame perimeter?

A: Per [Section 4.1.2 MATCH Setup] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284552), a pre-loaded POWER CUBE must be "fully and only supported by the ROBOT"; there is no requirement that it be contained within the FRAME PERIMETER.

(Asked by **5502** at Jan 11th 18)

Q83 levitate, and other power ups

Q: If my alliance were to activate the LEVITATE POWER UP early game, would we still be able to activate the POWER UPS later since we are allowed one POWER UP at a time?

A: [Section 4.3]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284554) of the manual states "Only one (1) instance of the FORCE or BOOST POWER UP can be active at a time. The LEVITATE POWER UP can be played at any time during the TELEOP stage." Playing LEVITATE does not affect when an ALLIANCE can play FORCE or BOOST.

(Asked by **2181** at Jan 12th 18)

Q84 Placement of Power Cubes

Q: Can you place power cubes anywhere on the field? For example, the opponents platform zone?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. !G20 and !G21 outline some of the restrictions on where ROBOTS can place POWER CUBES. For example, placing POWER CUBES on the opposing ALLIANCE'S PLATFORM to amplify the challenge of CLIMBING could result in an egregious violation of !G20.

(Asked by **3464** at Jan 12th 18)

Q87 Passive driver station communication

Q: Would it be legal to place passive, unpowered visual markers (QR codes, for example) on our driver station for the purpose of robot localization during autonomous?

A: Yes, per H07 as updated in [Team Update 2]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate02.pdf>), provided that the items are not manipulated in any way during the AUTONOMOUS period to maintain compliance with !A02.

(Asked by **2614** at Jan 13th 18)

Q88 Clarification of Q70

Q: Your response to Q70 states that "If the entire ROBOT is not currently resting on a single "flat floor" then the virtual transposition test is used to assess R24 compliance." Could you please provide a clearer definition of the virtual transposition test, so we can better understand R24 compliance?

A: The "virtual transposition test" was language used to attempt to describe the mental exercise of visualizing the ROBOT being moved from the uneven set of surfaces described to a single plane, flat floor and assessing it's conformance with the BUMPER ZONE requirement. Our apologies for any confusion it caused. Of course, you can also do the test in reality, but our assumption is that many ROBOTS aren't built yet.

(Asked by **6844** at Jan 13th 18)

Q89 Rung diameter

Q: What is the diameter of the rung used for climbing?

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. Any
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measurements or materials information can be derived from the Field Drawings available at:

[<http://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>]

(<http://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>)

(Asked by **3006** at Jan 12th 18)

Q90 Clarification on Q76

Q: Q76 asked when is a robot clear of G22B as it pushes a POWER CUBE into the exchange. A ROBOT pushing a POWER CUBE resting on the FIELD into the EXCHANGE & holding another POWER CUBE is a violation of G22. The question is, if the POWER CUBE is already in the EXCHANGE (completely contained on the rollers and outside the FIELD) and a ROBOT puts another POWER CUBE into the EXCHANGE, such that the 1st POWER CUBE is pushed further away from the FIELD by the 2nd, is there a G22 violation?

A: Yes, this is a violation of !G22. As stated in !Q76, !G22 applies "regardless of location," there is no "exemption" just because a POWER CUBE is inside an EXCHANGE.

(Asked by **5881** at Jan 12th 18)

Q91 Are electrically controlled pressure regulators allowed under R83-I?

Q: Would an electrically controlled air pressure regulator be allowed in an FRC pneumatics system. Specifically as a secondary pressure regulator, separate and downstream from the primary regulator required by R88. R83-I doesn't seem to restrict what types of regulators are allowed.

A: An electrically controlled pressure regulator is (or at a minimum contains) an actuator. If it meets the criteria of !R33 (likely as an "Electrical solenoid actuator" or "servo" with the corresponding restrictions) and is controlled per !R35, as well as meeting any other applicable rules, it would be permitted.

(Asked by **340** at Jan 12th 18)

Q92 Platform Material

Q: The rulebook describes the platform as 'textured plastic'-- what is the manufacturer, product brand name, and specific texture of this material?

A: There's some additional information about the material and texture noted in the [Field Drawings - *FIRST* POWER UP specific](<https://firstfrc.blob.core.windows.net/frc2018/Drawings/FieldDrawings-FIRSTPOWERUPspecific.pdf>) package, however the vendor and brand name are not available.

(Asked by **2877** at Jan 14th 18)

Q93 Using standard magnets as actuators

Q: As per Q52, electromagnets are not considered legal actuators on robots. Are permeant magnets legal to use?

A: A permanent magnet is not considered an actuator. While a permanent magnet is capable of causing motion, there is no method of control, making a permanent magnet more like a spring and not an actuator or motor.

(Asked by **2081** at Jan 12th 18)

Q94 Levitation and touching carpet

Q: Levitate has been activated. Robot A has climbed. Robot B is on platform with ramp touching carpet in platform zone. Robot C is fully supported by robot B with robot C's bumper 12" higher than the Platform.. Robot B's ramp remains in contact with the carpet and would not violate R24 if robot B was on a flat surface with the ramp deployed. Will robot B get the levitate and robot C a climb as robot C is fully supported by a climbed robot and its bumpers are more than 12" above the platform?

A: A ROBOT fully supported by another ROBOT that is *not* fully supported by the SCALE does not qualify for CLIMB points (nor PARK points for that matter). Per [Section 4.3] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284554), LEVITATE is "credited randomly to any ROBOT on the ALLIANCE who is not PARKING or CLIMBING at the end of the MATCH. If all ROBOTS on the ALLIANCE are either PARKING or CLIMBING, one randomly chosen PARKING ROBOT will be upgraded from PARKING to CLIMBING."

(Asked by **58** at Jan 15th 18)

Q95 Use of custom servo system

Q: Is it allowable to build a custom servo system using a legal motor (R33) and legal controller (R35) with a custom circuit (like a microcontroller to implement a feedback control loop)? I think R36 says it's ok. But R74 says that the PWM motor controller I'm using has to be connected directly to the RIO (or MXP/Spartan board). It seems to come down to whether my custom servo system becomes a "servo" per the rules or a motor + controller. Can anyone help with interpretation?

A: No, this is not permitted per !R74 (or !R79 for CAN controllers). A "servo" is a device marketed/sold by a manufacturer as a "servo" (and must be wired per !R37).

(Asked by **6204** at Jan 12th 18)

Q96 Clarification on COTS

Q: Are unmodified but assembled COTS gearboxes still considered COTS when brought to an event?

A: No, if the gearbox is shipped un-assembled, assembly is a modification/alteration that would make it no longer COTS. If no other modifications are made, disassembly would return it to the state it was received from the manufacturer (perhaps with the exception of some wear and leftover grease) and therefore COTS status.

(Asked by **316** at Jan 12th 18)

Q97 The answer to Q6 informs that "the box tubing is part of the RUNG" Yet 3.3.2 conflict this

Q: If the 2 in box tubing is part of the rung can we get 3.3.2 to read something like: RUNGS consist of a 1 ft. 1 in. (~33 cm) long 1 ¼ in. Schedule 40 aluminum pipe {INCLUDING THE} support{ING} 2 in. (~5 cm) box tubing. The current way many of us are reading this is that the rung is supported by the 2x2 tube singling out the 1 ¼ in.

Schedule 40 pipe as the rung. Rule G19 only excludes RUNGS not the supporting structure.

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. Suggestions and feedback should be directed to [firstroboticscompetition@firstinspires.org] (mailto:firstroboticscompetition@firstinspires.org).

(Asked by **3244** at Jan 15th 18)

Q98 Will the POWERCUBES being collected after the alliance have finished their POWER UP

Q: a) When alliance finished playing their POWER UP, where are the POWERCBES going to? b) If the POWERCUBES are gone, how many times can we active the BOOST and FORCE in a game? c) Can we take away the POWERCUBE if it is put in the columns but POWER UP are not active? d) How many POWERUP can be in a queue. For example, red team plays a POWERUP, blue plays after, then red plays again, but the first POWERUP has not expired, so there are 2 POWERUPS in the queue?

A: You may find the answer to !Q72 helpful. a) They stay in the vault. See !H14 b) All POWER UPS may only be activated once per MATCH per ALLIANCE. Please see [Section 4.3] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284554) c) No. POWER CUBES may not be removed from the VAULT, regardless of whether or not a POWER UP has been played. See !H14 d) An ALLIANCE may not have an active POWER UP and have one queued at the same time, so only one.

(Asked by **5831** at Jan 12th 18)

Q99 Can ramps be deployed in the last 30 seconds to get robots elevated 12 inches?

Q: Can ramps be deployed in the last 30 seconds to get robots elevated 12 inches?

A: We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

(Asked by **2187** at Jan 12th 18)

Q101 Clarification on Q52 regarding Electromagnets

Q: The answer to Q52 states that electromagnets are not considered an electric solenoid actuator. However, would they be allowed under R36 as a custom circuit or as an electric solenoid?

A: No, an electromagnet is an actuator (as activating or deactivating the magnet is capable of causing and controlling motion) and is therefore governed by !R33.

(Asked by **6802** at Jan 12th 18)

Q102 Are linear actuators modified with legal motors allowed?

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Q: R33 does not appear to allow any linear actuators, but the answer to Q80 seems to imply teams can change-out the non-legal motor to a legal one and then the actuator can be used. Per Q14, I know you do not rule on legality of specific part numbers. However, Andymark Dart actuator am-3072a was allowed by inspectors in years past. Are these devices considered COTS and allowable if motor that drives them is on the legal list (manual section 8.6)? Please clarify the ruling on linear actuators.

A: A linear actuator with no motor or other means of actuation is no different than a lead screw, gearbox, linkage or other similar device and should be assessed as such. If the device is legal (as determined per the previous sentence) there are no rules explicitly prohibiting powering it with an FRC legal motor.

(Asked by **5166** at Jan 13th 18)

Q104 Is a cube under a robot considered possession per G22?

Q: We are considering a design similar to a catamaran where our robot drives over the top of a cube and sometimes picks it up and other times does not. If the robot is 27 inches long, conceivably we could be sitting on top of 2 cubes, or 1 cube and another partially under us, even though we may not be touching both cubes. Would this be considered possession?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **4821** at Jan 12th 18)

Q105 Manipulator in addition to Driver

Q: In addition to the driver, could there be a manipulator present at the drive station? For example, the driver would control robot movement while the manipulator would control an arm that grabs and places cubes.

A: Per [Section 4.5 DRIVE TEAM]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284556), a DRIVE TEAM may contain up to 3 total DRIVERS and/or HUMAN PLAYERS (in any combination). There is no restriction on what ROBOT actions any of the DRIVERS or HUMAN PLAYERS may control.

(Asked by **6746** at Jan 12th 18)

Q106 Understanding "layers" of bumper fabric

Q: In the context of R30D and Q61, what constitutes a single "layer" of fabric? Many commercially-available woven fabrics are constructed of several layers of flexible, non-metallic fibers sewn, twisted, tied, woven, knitted, crocheted, intertwined, or braided together. Is it acceptable to cover bumpers with a single rugged, smooth fabric constructed of fibers of two (or more) different materials provided that the cross section in Figure 8-6 is not significantly altered?

A: A single layer of fabric, as purchased from a manufacturer, regardless of the number of layers of woven fibers, is what is intended by a "single layer of fabric." If the manufacturer sells it as multi-layer or 2+ ply, it is not considered a single layer.

(Asked by **2363** at Jan 12th 18)

Q107 Bumper Size

Q: If a side of our robot has a length less than 6 inches, (4.5 inches), is it necessary to cover it with a bumper of 6 inches? Or can we cover it with a bumper of the length of this size?

A: Per !R23, if a FRAME PERIMETER side is less than 6 inches, it must be fully covered by BUMPER (see Figure 8-3). Note that FRAME PERIMETER has a very specific definition; we recommend reviewing this definition, along with the bottom right corner of the top ROBOT in Figure 8-2, to aid in assessing legality.

(Asked by **6832** at Jan 12th 18)

Q108 What are the dimensions of the ramp for the exchange?

Q: In the manual (pg 27), it says the ramp is 1 ¾ inches tall. In the field tour video for the exchange (1:10), it says the ramp is 1 ⅝ inches tall. In the field drawings (pg 6), it says the ramp is 1 ½ inches tall. At least two of these must be wrong. Which are they? On top of that, it never states the angle of the ramp (it can't be calculated due to lack of proper height), nor does it state how wide the two side pieces of the ramp are. What are all these measurements? Thanks in advance! -2554

A: Thank you for your question, and our apologies for the discrepancies. We think [Team Update 2] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate02.pdf>) answers your questions. If not, please resubmit.

(Asked by **2554** at Jan 13th 18)

Q109 Removing POWER CUBES from Piles

Q: With regard to G22, if a robot contacts a single POWER CUBE at the base of a POWER CUBE PILE and attempts to remove it from the pile, and in doing so causes other POWER CUBE(S) resting on top of the controlled POWER CUBE to move, are the other POWER CUBE(S) in the pile considered to be under "control" of the robot? If the movement is brief, would this form of interaction with the POWER CUBE PILE be considered "plowing" or else an alternate form of interaction not considered "control"?

A: Generally speaking, "brief contact with a large quantity of POWER CUBES while attempting to break up a pile" does not in and of itself violate !G22, as long as the action is brief. The action you describe may also involve "deflecting," which is also exempt from !G22. However, we cannot comment absolutely on hypothetical scenarios, as there are ways to violate !G22 while also "plowing" (such as herding two POWER CUBES into a POWER CUBE PILE). The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **1024** at Jan 12th 18)

Q110 Damaged Bumpers and Loose Threads

Q: CLIMBING is partially defined in Table 4-1 with the following clause: "... with BUMPERS fully above the BRICKS at T=0...". If a robot's bumpers are damaged during the match such they are still firmly secured within the bumper zone but the fabric is torn and a thread dangles below the BRICKS while all bumpers meeting the definition of a BUMPER as illustrated in Figure 8-6 are above the BRICKS and all other conditions related to a CLIMB are satisfied, will the robot earn a CLIMB?

A: If any part of the BUMPER (including loose fabric or "dangling threads") is below the BRICKS at TELEOP T0, the ROBOT does not meet the definition of CLIMBING (it might, however, meet the definition of PARKING). We recommend building your BUMPERS such that you will not inadvertently prevent yourself from scoring a CLIMB!

(Asked by **1675** at Jan 12th 18)

Q111 Power Up Sounds

Q: Table 3-1 of the manual outlines the lighting schemes for the plates including how the various POWER UPS will be represented. In the game animation, a sound effect is heard when the BOOST POWER UP is activated. Will there be sound effects in the arena when POWER UPS are activated? If so, will each power up have a specific sound? If not, I beseech you to consider adding sounds - lights can be easy to overlook whereas an additional audio signal, like the 30 second warning, can be very helpful. TY

A: This is more of a suggestion than a question about the rules, so we normally would suggest you email it to firstroboticscompetition@firstinspires.org. However, we already did have plans for additional game sounds and will be including that information in the manual. See [Team Update 3] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate03.pdf>)

(Asked by **1675** at Jan 17th 18)

Q112 Extending While Preloading Power Cubes

Q: Rule 4.1.1 states that teams may choose to pre-load POWER CUBES onto their ROBOT. Does Rule R03, which stipulates that ROBOTS be constrained to a volume of 33 in. by 28 in. by 55 in. tall, still apply in this situation?

A: Yes, the ROBOT must be within the STARTING CONFIGURATION regardless of whether or not they are starting the MATCH with a POWER CUBE. The POWER CUBE, however, is not subject to the STARTING CONFIGURATION

(Asked by **4373** at Jan 12th 18)

Q115 Can a robot CLIMB by climbing onto another not CLIMBING robot?

Q: Is it legal, considering that a robot simply must be above 12 in, not be in the opponents PLATFORM ZONE, and not be in direct contact with their PLATFORM, for a robot that has not CLIMBED to allow one or more fellow alliance robots to, in full compliance of rule G17, climb onto itself, by means of a ramp, for example, and thus be considered having CLIMBED as long as they are above the 12 in. mark at T=0 and do not violate rule G19, or must a robot physically "climb" to have CLIMBED?

A: CLIMBING is a defined term in the manual, in both [Section 4.2] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503546548) and the [Glossary] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503546601). It does not require 'climbing' in the colloquial sense, and it is possible, assuming all rules are met, for ROBOT A to support ROBOT B in such a way that ROBOT B is CLIMBING.

(Asked by **3990** at Jan 14th 18)

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Q116 Pixel fonts for bumper numbers

Q: In keeping with the 2018 theme, we are considering printing our team number on the bumpers in the 7x5 regular font (<http://www.fontsaddict.com/font/07x5-regular.html>) in white, with each pixel approx 5/8" square. Does a pixellated font (white on fabric) with each pixel more than 1/2" across and a character height greater than 4" comply with R28(A) requiring a minimum 1/2" stroke width, even though the "logical strokes" on diagonals and around corners have portions much narrower?

A: ****Updated: Jan 23, 2018**** We can't rule on individual fonts. But in !R28, when we say stroke widths must be a minimum of 1/2", we mean that minimum width, perpendicular to stroke direction, must be maintained all throughout the stroke**, except for serifs, etc. as described in the Blue Box added to !R28 in [Team Update 5] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate05.pdf>).** A single diagonal line made up of individual pixels would be considered a single stroke, not a series of pixel-size strokes.

(Asked by **3946** at Jan 14th 18)

Q117 G05: clarification about the 16"

Q: G05 : Is the 16" the sum of left and right, or can we extend beyond the frame perimeter from 16" on two different sides at the same time?

A: !G05 does not prevent you from extending up to 16" (41 cm) beyond the FRAME PERMITER on multiple sides simultaneously.

(Asked by **2626** at Jan 13th 18)

Q118 Is control of a powercube transitive through other robots?

Q: If Robots A and B are each carrying or otherwise controlling a powercube, and robot A interacts with robot B in a way which would be considered controlling (e.g. attempting to pin would be herding), does this violate G22?

A: No. For the purposes of *FIRST* POWER UP, a ROBOT pushing or otherwise interacting with another ROBOT that's holding a POWER CUBE is not considered controlling that other ROBOT's POWER CUBE.

(Asked by **3946** at Jan 14th 18)

Q119 Question about allowable robot actions during the Endgame

Q: Rule G17 indicates Unless during the ENDGAME, ROBOTS may neither fully nor partially strategically support the weight of partner ROBOTS. But is there any restrictions on what time during teleop a robot may contact the rung? Restriction on what time during teleop a robot may become directly supported by the rung?

A: There are no restrictions on what time during a MATCH a ROBOT may contact or be supported by the RUNG.

(Asked by **663** at Jan 13th 18)

Q120 R33 Automotive Motors: Is a Doga PM-7044-2D-01 a legal motor?

Q: R33 Automotive Motors: Is a Doga PM-7044-2D-01 a legal motor? Select Automotive Motors (Window Door,

Windshield wiper, Seat, Throttle) with Various part numbers are legal. Does this motor (which is 12V) qualify or would it be considered illegal?

A: We can't rule on individual Automotive Motors. However, if the Automotive Motor is classified by the manufacturer as a Window, Door, Windshield wiper, Seat, or Throttle motor, it is legal per !R33. You should bring proof of this classification to your event to show the Inspectors.

(Asked by **3036** at Jan 13th 18)

Q121 If supported transitively, would a robot hanging over null, not platform, get points?

Q: If Robot A is hanging from the bar on the scale, with Robot B hanging off of them, thus making Robot B transitively supported by Robot A, does Robot B need to be fully above the platform? Put another way, if Robot B is hanging over carpeted null area, but is still fully supported on the scale transitively by Robot A, will full points be awarded?

A: A ROBOT being in the space above their PLATFORM is not one of the criteria required in order for it to qualify for a CLIMB. Per Table 4-1, "For each ROBOT fully supported by the SCALE (either directly or transitively) with BUMPERS fully above the BRICKS at T=0, not in direct contact with their PLATFORM, and not at all in the opponent's PLATFORM ZONE."

(Asked by **1649** at Jan 13th 18)

Q122 Dimensions of decal for the exchanges/portals

Q: What are the dimensions for the decals on the exchange/portal walls? (referring to the arrow and cube)

A: Thank you for your question. Per [Team Update 03] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate03.pdf>), we have re-released the [CAD Models] (<https://firstfrc.blob.core.windows.net/frc2018/Drawings/2018FIRSTPOWERUP-SolidWorksModels.zip>) which now includes the decal files, from where you can get this information. Please note that these decals are designed to be decorative and are subject to wear and tear. We can't guarantee their condition at any individual event.

(Asked by **88** at Jan 17th 18)

Q123 Carpet used in ARCADE discontinued?

Q: Section 3.2 of the manual specifies Shaw Floors Neyland II 20 "Ground Pepper" as the carpet used in the ARCADE. However, the Neyland II 20 line appears to be discontinued (the Shaw Floors website only lists a "Neyland III": <https://shawfloors.com/search/carpet?searchtext=neyland&searchmode=allwords&page=1>). Will all official events still be using this type of carpet? Is there a new type of carpet that is considered equivalent, should teams wish to test under conditions identical to competition?

A: All official _FIRST_ POWER UP competitions will use the "Shaw Floors Neyland II 20 Ground Pepper" specified in Section 3.2. However, the exact model has been discontinued by the manufacturer. We have used "Neyland III" for our Kickoff carpet, and its physical characteristics are similar. Admittedly, without further testing we cannot verify that it is "identical".

(Asked by **254** at Jan 15th 18)

Q124 Legality of Ramps leading to Platform

Q: Are the ramps leading up to the platform considered part of the platform and by extension part of the scale?

A: Good question, and our apologies for the ambiguity in the manual. Yes, the ramps are part of the PLATFORM as clarified in [Team Update 3]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate03.pdf>).

(Asked by **6324** at Jan 17th 18)

Q125 Where may I find the blueprints for FE-00041-02 and -03?

Q: The Layout and Marking Diagram has references to diagrams for the Side Border (FE-00041-02) and the End Wall (FE-00041-03) for the driver stations and the field perimeter, on page 2 of 4. I was unable to find them in any of this year's blueprints.

A: Good catch! These will be added in Team Update 3.

(Asked by **2869** at Jan 15th 18)

Q126 If we activate boost, will the opposing team receive double points for tipping the scale?

Q: If our alliance activates boost and the opposing alliance tips the scale or the switch, will they receive double points? Neither 4.3 Power Ups nor Table 4-2: Power Ups references what happens if we activate boost and the other alliance owns the scale and/or switch.

A: Per Table 4-2, the definition of BOOST is to "Doubles the points being earned by the ALLIANCE". The ALLIANCE is the ALLIANCE who played the POWER UP. So, no, the opposing ALLIANCE cannot receive benefits from your ALLIANCE playing BOOST.

(Asked by **4391** at Jan 14th 18)

Q127 Pneumatics: Storage tanks

Q: How many air storage tanks are allowed on the robot concerning pneumatics?

A: There are no rules explicitly specifying a maximum number of pneumatic storage tanks.

(Asked by **3848** at Jan 14th 18)

Q128 Can you use POWER UPs in autonomous?

Q: A05 states that human players cannot touch any power cubes during auto without accepting a foul per POWERCUBE, but Table 3-1 shows that the field still allows for using FORCE during auto. Can you still use POWER UPs during auto? Or would it mean receiving a foul?

A: Table 3-1 was updated to remove references to POWER UPS during AUTO in [Team Update 1] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdates-combined.pdf>). It's important for all teams to stay current with Team Updates, which come out every Tuesday and Friday.

(Asked by **2990** at Jan 15th 18)

Q129 POWER CUBES in opponent's PLATFORM ZONE - NOT off limits?

Q: G23 states that "POWER CUBES in opponent's POWER CUBE ZONE - off limits." The lack of verbage regarding POWER CUBES in the opponent's PLATFORM ZONE leads us to interpret those POWER CUBES as fair game for opponents to use, pick up, or manipulate as though they are not controlled by either alliance. Is this interpretation correct? In other words, are POWER CUBES in an opponent's PLATFORM ZONE not off limits?

A: The POWER CUBE ZONE and the PLATFORM ZONE are not related. There are no rules prohibiting an ALLIANCE from retrieving a POWER CUBE from the opponent's PLATFORM ZONE.

(Asked by **6318** at Jan 14th 18)

Q130 Budget Question

Q: Per R11, KOP items are exempt from the CAW. If an item is listed on the KOP or FIRST choice, but not received from either of those sources, is it still exempt from the CAW?

A: Yes. Please see the definition of KOP in the [Glossary] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503546601). Any item that was ever listed on a Kit of Parts checklist or distributed via FIRST Choice is considered a KOP item, regardless of source of the specific part you are using on your ROBOT.

(Asked by **5002** at Jan 14th 18)

Q132 Unlimited KOP item quantity?

Q: Are KOP items which exceed the number provided in the KOP required to be listed on the CAW? for example - if all the CIMs from the physical KOP and the ones acquired through FIRST Choice are used, does the cost of any additional CIMs need to be included?

A: No. !R11 does not have a threshold above which KOP Items must be listed on the CAW. Also, the answer to !Q130 may be helpful.

(Asked by **1741** at Jan 14th 18)

Q133 FRAME PERIMETER vs. Drive Base Perimeter

Q: If the frame of our drive base is less than the specified FRAME PERIMETER and a mechanism of our robot extends out of our drive base perimeter but within the FRAME PERIMETER and the Bumper Perimeter. Is that legal?

A: "Drive Base Perimeter" is not a term used in the manual, so we're not sure what you are asking. Per !R04,

robots may not extend more than 16" (~40 cm) beyond the FRAME PERIMETER except during the ENDGAME. !R01 defines what the FRAME PERIMETER is for your specific ROBOT. You may find the blue box especially helpful. The exact size and shape of FRAME PERIMETERS will vary from team to team. If this does not answer your question, please rephrase and ask again.

(Asked by **5069** at Jan 14th 18)

Q134 DIRECT CONTACT

Q: Can you please clarify what is meant by "direct contact" with the platform? Does this amendment to the Climb definition mean that any part of a particular robot touching the platform at T=0 will void that particular climb attempt of that robot, even if its bumpers are elevated above the bricks?

A: Yes, direct contact means touching. If any part of a ROBOT is touching the PLATFORM at T=0, it will not meet the criteria for CLIMBING in Table 4-1 of [Section 4.2]
(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503546548)

(Asked by **773** at Jan 14th 18)

Q135 Bumper Zone Duing Endgame

Q: Does the bumper zone defined in R24 apply during the endgame? Does vertically lifting the robot, by exerting a downward force against the platform during the endgame, violate R24, if the bumpers are lifted above the 7' zone?

A: 1. Yes, !R24 applies all the time. 2. Yes.

(Asked by **773** at Jan 14th 18)

Q136 Exchange and Portal Graphics

Q: Can the official exchange and portal panel graphics be added to the posted Playing Field Details?

A: Thank you for your question. Per [Team Update 03]
(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate03.pdf>), we have re-released the [CAD Models](<https://firstfrc.blob.core.windows.net/frc2018/Drawings/2018FIRSTPOWERUP-SolidWorksModels.zip>) which now includes the decal files. Please note that these decals are designed to be decorative and are subject to wear and tear. We can't guarantee their condition at any individual event.

(Asked by **6364** at Jan 17th 18)

Q137 ROBOT standing normally vs Robot Climbing

Q: R24 Bumpers mentioned "7½ in. (~19 cm) above the floor in reference to the ROBOT standing normally on a flat floor". With this understanding, during the end game, can a robot mechanism momentarily pushed down to elevate the entire robot above the bricks, and retract itself to its starting position after the robot attached itself to the rung, before t-0? This question is not about moving bumpers from their normal position on the robot, nor about if the robot is touching platform at t-0.

A: No, !R24 applies at all times. If a ROBOT's BUMPERS would fall outside the BUMPER ZONE, when placed normally on a flat floor (without changing ROBOT configuration), at any point during the MATCH, it is a violation of

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!R24.

(Asked by **5860** at Jan 15th 18)

Q138 Is the cube a part of the 16 inch extension after starting configuration?

Q: R04 states that ROBOTS may not extend more than 16 in. (~40 cm) beyond their FRAME PERIMETER except during the ENDGAME. Would the sixteen inches include a power cube if supported by the robot but the robot mechanism is within the legal requirements?

A: No, POWER CUBES are not part of the ROBOT and therefore do not count towards restrictions such as the 16 in. extension limit.

(Asked by **3036** at Jan 15th 18)

Q139 Define the perimeter.

Q: R01 defines the perimeter as the length of a string wrapped around the frame at the bumper zone. The answer to question 113 says "the exact size and shape of Frame Perimeter will vary from team to team. Are the measurements of 28 x 33 the hard maximum sizes? The perimeter of a 28 by 33 base would be 122 inches. Could we use a 30 inch square base which would have a perimeter of 120 inches?

A: **Edited Feb. 13, 2018** !R01 defines the FRAME PERIMETER of a ROBOT. Further instances of FRAME PERIMETER in the Manual refer to this definition. !R04 restricts ROBOT size in the STARTING CONFIGURATION ~~and does not refer to FRAME PERIMETER~~. A 30 in. square will not fit within the constraints of !R04.

(Asked by **386** at Jan 15th 18)

Q140 robot size

Q: R03 States the maximum robot size excluding bumpers in the starting configurations can be up to 50,820 cubic inches. Can we then assume we could in theory start with a robot that is 60 inches tall?

A: !R03 gives maximum dimensions of the ROBOT in STARTING CONFIGURATION. The term 'volume' in the rule was meant to indicate a 3-dimensional space, not a maximum cubic measurement. The maximum height is 55", so no, a ROBOT may not have a STARTING CONFIGURATION 60" tall.

(Asked by **5420** at Jan 15th 18)

Q141 Can a device in airplane mode be brought into the ARCADE?

Q: H07 says that devices used for certain purposes can be brought into the ARCADE, provided they "do not communicate with anything or anyone outside of the ARCADE" and "do not include any form of enabled wireless electronic communication (e.g. radios, walkie-talkies, cell phones, Bluetooth communications, Wi-Fi, etc.)", among other things. Would a device (e.g. a tablet) in Airplane Mode, which turns off all network communications, be prohibited?

A: Provided other elements of H07 are not violated (such as "do not in any way affect the outcome of a MATCH, other than by..."), putting a device in Airplane Mode does satisfy the "do not include any form of enabled wireless electronic communication" clause.

(Asked by **449** at Jan 15th 18)

Q142 How many regulators are allowed

Q: R83.I: "Pressure regulators with the maximum outlet pressure adjusted to no more than 60 psi (~413 kPa)" The plural "regulators" implies that there may be multiple pressure regulators. Then R88: "'Working" air pressure on the ROBOT must be no greater than 60 psi (~413 kPa) and must be provided through a single primary adjustable, relieving, pressure regulator." It says "single primary" which sounds like "only one". Please clarify whether there may be any/multiple secondary regulators?

A: Yes, there may be any number of additional secondary pressure regulators provided that all air passes through the single primary regulator as specified in !R88.

(Asked by **4999** at Jan 16th 18)

Q143 Does the exclusion of minor protrusions pertain to height?

Q: Does the exclusion of minor protrusions in the starting configuration (R02) in the horizontal directions pertain to the vertical dimensions? For example, would a bolt head protruding above 55" be acceptable?

A: **Edited Feb. 13, 2018** No, the exception for minor protrusions in !R02 applies to the determination of FRAME PERIMETER only ~~and does not apply to any of the dimensions in !R03~~. ROBOTS must meet all STARTING CONFIGURATION size constraints in !R03 with ~~no~~ *its noted* exceptions.

(Asked by **4738** at Jan 15th 18)

Q144 Can 3 Climbs be awarded for 2 Robots being raised by the third robot utilizing Levitate?

Q: While on the scale platform with 30 seconds to play, our robot deploys ramps or other devices to allow the other two robots drive up or be lifted up by our robot to get their bumpers above the 12 inch mark. We also activate the Power-up levitate button during the match. Considering the other two robot's bumpers are above 12 inches and we are awarded the Levitate, will we be awarded three climbs?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. However, it is possible for three CLIMBS to be awarded with two ROBOTS meeting the criteria for CLIMBING, and the LEVITATE POWER UP being played by the ALLIANCE.

(Asked by **2557** at Jan 15th 18)

Q145 Penalty for violating R24

Q: Assume for this question that a team misunderstands the R24 (BUMPER ZONE rule) and violates it during an early match (eg a robot is on the platform, extends a long ramp down to the carpet 3.5" below it). I see G07 clearly

would apply, but only mentions a simple FOUL unless a bumper "becomes completely detached". But G05 (with its RED CARD if strategic stipulation) only applies to FRAME PERIMETER as well as specifically excluding endgame. What will the penalty be?

A: !R24 is a ROBOT Rule and will be checked, to the extent possible, during Inspection. Given that !R24 is a BUMPER rule, violation during the MATCH would be subject to !G07 and result in a FOUL and could potentially be assessed a YELLOW or RED CARD if the violation is deemed egregious by the Head REFEREE (per !T03). Additionally, the ROBOT would be subject to Re-Inspection prior to being eligible to participate in subsequent MATCHES.

(Asked by **2834** at Jan 15th 18)

Q146 Platform size

Q: There is a contradiction between the field drawings (page.101) and the game manual (page.22) about the size of the platform top: in the field drawing the size is 8 feet while in the manual it's 8"8. Which measurement is the correct one?

A: Apologies, we disagree with the question's premise that the width of the PLATFORM, per the [Field Drawings - *FIRST* POWER UP Specific](<https://firstfrc.blob.core.windows.net/frc2018/Drawings/FieldDrawings-FIRSTPOWERUPspecific.pdf>), is only 8 ft. The drawing (GE-18060) shows four (4) pieces, each 26 in. wide (GE-18061 & GE-18062), for a total of 8 ft. 8 in.

(Asked by **2630** at Jan 16th 18)

Q147 Section 4.3, update 2. Is the button press "ignored" or "queued" ?

Q: Section 4.3 Update 2 says "If an ALLIANCE pushes the button for FORCE/BOOST while their other FORCE/BOOST is active, the button press is ignored." I was told by a game representatives at the Manchester kickoff, this scenario would lead to the button press being queued; IOW it would be similar to "If an ALLIANCE plays BOOST or FORCE during the time when an opposing ALLIANCE's POWER UP is active, the POWER UP is queued..." (also section 4.3). Can you confirm this is ignored and not queued?

A: Correct, ignored, not queued.

(Asked by **4048** at Jan 16th 18)

Q148 What counts as "throwing in a forceful way" in G22?

Q: G22 gives "throwing in a forceful way" as an example of "launching". Since G09 only allows launching under limited circumstances, please clarify what would or would not count as "throwing in a forceful way". For example, it would be useful to have a maximum exit velocity (relative to the robot?) that teams could design for and refs could be trained against.

A: We will not be specifying a maximum exit velocity, nor are we able to further define "throwing in a forceful way". If you're worried that your ROBOT may be launching a POWER CUBE, we recommend making sure your ROBOT is positioned as outlined in !G09 to avoid a penalty. The ultimate decision as to launching would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **199** at Jan 16th 18)

Q149 Flag Standard

Q: Is there a flag standard this year?

A: The items known as Team Standards (2016) and Team Banners (2017) will not be used in **_FIRST_ POWER UP**. Instead, we encourage you to submit a [Team Avatar](<https://www.firstinspires.org/robotics/frc/blog/something-new-team-avatars>) ([submission portal details here](<https://www.firstinspires.org/robotics/frc/blog/team-avatar-submission-system>)). Team flags brought to the event to be hung or waved by your team, or brought to the MC to be used as part of team intros are still allowed and are covered by Event Rules !E15 through !E20.

(Asked by **5903** at Jan 16th 18)

Q151 Rule R33 - "legal" gearboxes

Q: Rule 33 lists all of the allowable motors but does not list or say anything about gearboxes that are attached directly to the motor. Does that mean that we can use any gearbox that meets our needs?

A: There are no rules specifically governing the use of gearboxes, with the exception of the Blue Box note in !R34 regarding specific motors. Any gearbox used must meet all applicable ROBOT rules (e.g. cost, fabrication schedule, etc.).

(Asked by **4056** at Jan 16th 18)

Q152 FIRST Logo on bumpers

Q: Are we required at all to have FIRST Logos on our bumpers?

A: No, there are no rules requiring you to apply a **_FIRST_** logo to your BUMPERS.

(Asked by **6379** at Jan 16th 18)

Q153 Grappling Hook?

Q: Can there be a hook suspended by only a rope, which is connected to the robot, to climb at endgame.

A: We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

(Asked by **3848** at Jan 16th 18)

Q154 Cube Launching Transitive Contact Rule G09

Q: Rule G09 states that a robot may only launch a cube onto the switch while contacting the fence surrounding the switch with its bumpers. Does this have to be direct contact, or can it be transitive? So if a robot is contacting the fence and blocking you from contacting the fence, could you contact that robot and launch a cube over the robot blocking you, onto the plate?

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A: !G09 does not allow for transitive contact, so, in your example, launching a POWER CUBE over another ROBOT that is blocking access to the FENCE of a SWITCH would result in a violation of !G09. Repeated violations of this rule are likely to escalate rapidly to YELLOW or RED CARDS.

(Asked by **2175** at Jan 16th 18)

Q155 BUMPER ZONE height in R24 vs Glossary

Q: There is a conflict regarding the BUMPER ZONE height in R24 (7-1/2") and the GLOSSARY (7"). Please clarify.

A: Good catch! The correct height is 7-1/2", and this has been fixed in [Team Update 3] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate03.pdf>). Thanks!

(Asked by **980** at Jan 17th 18)

Q156 H07-B, placed prior to the start of Auto

Q: In reference to Q63. Would an item listed in H07-B, placed prior to the start of Auto and not touched by the drive team during Auto be considered in violation of A02?

A: No, this would not be a violation of !A02

(Asked by **2073** at Jan 16th 18)

Q157 G19 Tower Interaction

Q: Rule G19 states that robots are prohibited from grabbing, grasping, attaching to, hanging, deforming, and becoming entangled with the tower. If contact is made on either side of the tower simultaneously or independently and the tower experiences incidental force (ie arms or manipulators running into it) due to rotation while hanging, could this be considered breaking G19?

A: Incidental, non-damaging force applied to the TOWER would not be considered a violation of !G19

(Asked by **1764** at Jan 16th 18)

Q158 G05 oriantaion of the robot when extending beyond the 16" perimeter the last 30 seconds

Q: "R04 and G05 robot extending no more than 16" outside the frame perimeter. When the Robot is in its PLATFORM ZONE this rule does not apply." Figure 7-1: Examples of G05 compliance and non-compliance Endgame only show the robot as if it was hanging. Can we assume that if the robot was still on the ground, In the PLATFORM ZONE, during the last 30 sec the 16" rule does not apply?

A: Per !G05, a ROBOT only needs to be fully within its PLATFORM ZONE during the ENDGAME for the 16" extension requirement to not apply. It does not need to be hanging.

(Asked by **3244** at Jan 16th 18)

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Q159 G25 while placing a cube onto the Scale part one

Q: Red currently has ownership of the SCALE. A Red robot is attempting to place another POWER CUBE onto their end of the SCALE, but stops when the cube is half an inch above the PLATE. Now a Blue robot places a cube onto the other end. The scale moves half an inch and then is stopped by the cube held by the Red robot. a) Is this a violation of G25? The cube held by the Red robot is preventing the plate from moving up; however, if the Red robot released the cube, the plate would move back down.

A: We cannot comment absolutely on hypothetical scenarios, but we think [Team Update 6] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate06.pdf>) will provide some clarification. If you still have a question, please rephrase and resubmit.

(Asked by **948** at Jan 26th 18)

Q160 G25 while placing a cube onto the Scale part two

Q: If the situation in Q159 is not a violation: now the Blue team adds two more cubes to their plate. Now if the Red robot released the cube and backed away, the scale would switch ownership. a) Is this now a violation of G25? b) If so, does G10 apply, since actions by the Blue robots caused Red to begin violating the rule? c) Or, is there a minimum time that Red has to move or it will become a violation? This is being discussed on Chief Delphi. We need a consistent answer across all regions.

A: We cannot comment absolutely on hypothetical scenarios, but we think [Team Update 6] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate06.pdf>) will provide some clarification. If you still have a question, please rephrase and resubmit.

(Asked by **948** at Jan 29th 18)

Q161 Pressure allowed at start of match?

Q: Before a match starts, can we have stored air pressure? Specifically, during autonomous, can we have 120psi stored, or must we begin the match unpressurized? Thank you!

A: Yes, this is an allowable energy source per !R45-A. Please pay careful attention to !R85 and !R87, though, regarding the source and requirements for this pre-charged compressed air.

(Asked by **5516** at Jan 18th 18)

Q162 Using scale protrusion to assist with hanging?

Q: Figure 3-10 shows a 2 inch protrusion of the scale. If a robot were to deploy a mechanism on both sides of this to help counteract rotational forces when hanging at the end of the match, would that be violating rule G19? At what point could it be considered grasping?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. There is no _FIRST_ Robotics Competition specific definition of grasping. In general, a robot reacting against opposing faces of an element simultaneously may be considered grasping per !G19.

(Asked by **5842** at Jan 17th 18)
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Q163 Technician replace the battery after using it to charge the pneumatic system

Q: Can the Technician replace the battery after using it to charge the pneumatic system, all prior to the match? Under R45 you can have the air filled at the beginning, so with the Technician's job being to replace the battery before the match, does that mean he can replace the battery after he uses it to charge the pneumatic systems, as long as it's all before the match, or is it stated somewhere where he can't do that.

A: There are no rules prohibiting this, provided that !G08, !R85 and !R86 are followed.

(Asked by **23** at Jan 18th 18)

Q164 R19F LRI pre-inspection via telepresence?

Q: Thank you for allowing the R19F exemption for unofficial pre-inspections done in the "presence" of a certified 2018 LRI. Are there any rules that restrict the practice of these pre-inspections? For example, may they be done via telepresence?

A: !R19 F states "with a certified 2018 LRI present," "telepresence" does not satisfy this requirement, and thus, is a violation of the bag-and-tag procedure.

(Asked by **2363** at Jan 17th 18)

Q165 Sending POWER CUBES through the EXCHANGE during AUTO

Q: Just to clear things up between our team, There is not rule explicitly stating whether or not PLAYERS are allowed to put POWER CUBES through the EXCHANGE during AUTO. Is there any rule against this? This would change our strategy either way.

A: There are no rules explicitly stating whether ROBOTS can place POWER CUBES through the EXCHANGE during AUTO. Rules !A01 and !A05 would prevent DRIVE TEAMS from interacting with POWER CUBES in the EXCHANGE during AUTO.

(Asked by **3242** at Jan 16th 18)

Q166 R30: Hard bumper parts beyond the end of a bumper segment's wood backing

Q: Regarding R30, can hard bumper parts that stay within 1" of the frame perimeter extend horizontally from the ends of a bumper segment's wood backing? If so, how far?

A: We believe !Q32 answers your question. If it does not, please rephrase your question and resubmit. Please use the Search Q&A button on the navigation bar before posing a new question.

(Asked by **1619** at Jan 17th 18)

Q167 R23: Number of bumper segments permitted on a given frame perimeter side

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Q: Regarding R23, is it permitted to have more than two bumper segments on a given frame perimeter side?

A: Yes. R23 does not require a single BUMPER segment to protect any given FRAME PERIMETER side.

(Asked by **1619** at Jan 17th 18)

Q168 Materials?

Q: Can we use rope and if so can we make knots on it in order to climb.

A: We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

(Asked by **2543** at Jan 17th 18)

Q169 Quick change bumper covers

Q: Rule R26 states the entire BUMPER, not just the cover must be easily installed and removed. If the bumpers meet this requirement, can a team still use detachable red and blue covers instead of replacing the entire bumper for changing the alliance color?

A: Yupper

(Asked by **4328** at Jan 17th 18)

Q171 Use of "Arabic" in R28A as updated in Team Update 03

Q: Did your update to R28 (A) mean that you wanted our team numbers on the bumpers to look like this: ٣٩٤٦ ?

A: Nope. "Arabic numerals" describes the set of ten symbols: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 (for example, as described by [this Encyclopedia Britannica article](<https://www.britannica.com/topic/decimal-number-system>)).

(Asked by **3946** at Jan 18th 18)

Q172 R19F - LRI Contact Information and Q164 Follow-Up

Q: Presumably, the point of R19F is to enable teams to go through an inspection in their own lab with either a visit from a friendly neighborhood LRI or by having LRIs host an "inspection day" for these teams to attend. However, many teams do not know who their friendly neighborhood LRI is. How can teams obtain such information? Additionally, given the answer to Q164, are there any options for teams who are not near an LRI? Could an RI be used as a substitute given permission/guidance from an LRI?

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. For other inquiries, please contact [firstroboticscompetition@firstinspires.org] (mailto:firstroboticscompetition@firstinspires.org)

(Asked by **900** at Jan 18th 18)

Q173 Team update 3 to R83

Q: The most recent team update added "~6mm" to the solenoid valve port dimensions: "Solenoid valves with a maximum ⅜ in. (nominal, ~6 mm) NPT, BSPP, or BSPT port diameter". The update stated it was part "E", while that line is in actuality part "D". Since 1/8" is significantly less than 6mm, can we get clarification on the maximum limit for the solenoid port diameter? It's worth noting that part E refers to pneumatic tubing with a diameter of 1/4", which is a better match for the 6mm designation

A: Pipes are designated according to different measurements in different systems. 1/8" NPT and 6mm Metric are proper equivalents.

(Asked by **2177** at Jan 18th 18)

Q174 Section 10.8: Definition of "outcome of the match"

Q: Regarding Section 10.8, what is the definition of "outcome of the match"?

A: Good question. The outcome of the MATCH is affected if an error occurs that, in the judgment of the Head REFEREE changes which ALLIANCE would have won the MATCH and/or the assignment of Ranking Points, and we've clarified in [Team Update 4]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate04.pdf>).

(Asked by **1619** at Jan 22nd 18)

Q176 Rule G06 "Keep it Together" Clarification

Q: Does it violate rule G06 if a ramp is deployed, fully contained in the platform zone, during the end game and the only attachment point to robot A that deployed the ramp is a small string?

A: A part that is still attached to the ROBOT is not a violation of !G06. Note that for !G05 to apply, the entire ROBOT must be contained within the PLATFORM ZONE and that to meet the definition of CLIMBED the ROBOT must not be in direct contact with their PLATFORM.

(Asked by **6193** at Jan 18th 18)

Q177 Wired Headset

Q: Would a wired headset, used to display a video feed from the drive-station laptop, be considered part of the OPERATOR CONSOLE and therefore allowed?

A: We cannot comment definitively on legality of a specific part. In general, elements attached to the OPERATOR CONSOLE (as defined in !R98), which do not violate any other rules, may be considered part of the OPERATOR CONSOLE. Note that !A03, which restricts the use of worn or held devices during AUTO, is one of a number of rules which may apply. If you still have a question about device legality, please consult [Section 1.8]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

(Asked by **4180** at Jan 19th 18)

Q178 G05 Clarification

Q: Just to clarify, Is G05 is referring to the entire PLATFORM ZONE from the scale to the switch, and not just the PLATFORM itself? For example, it would be legal to have part of your robot on the carpet of the PLATFORM ZONE, while some of it was also on the PLATFORM.

A: That's correct, !G05 used the term PLATFORM ZONE intentionally. The definition of PLATFORM ZONE can be found in [Section 3.1]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889750)

(Asked by **5209** at Jan 18th 18)

Q179 Bumper Limits

Q: If we have a 33" by 24" robot with a u-shaped design (one fully open side). The edges that extend over the side are less than 6". Can the bumper be less than 6" for the side if they are fully covered? We were inspired by the designs by Team Zou Keepers and Ri3d Elijah that have designs with an open intake in which the open edges are less than 6". Figure 8-2 seems to contradict R23 in which it states that if a side is "shorter than 6 in, that entire side must be protected by a bumper".

A: We can't comment on specific ROBOT designs. However, per !R23, a BUMPER can be less than 6" only if a FRAME PERIMETER side is less than 6", and that side must still be fully protected by BUMPER. Figure 8-2 does not show any FRAME PERIMETER sides less than 6", and the BUMPER shown that is less than 6" is also labeled "Not OK". Please keep in mind that FRAME PERIMETER is not the same as 'frame'. The blue box in !R01 can be helpful in determining FRAME PERIMETER. If this does not answer your question, please rephrase and ask again.

(Asked by **4817** at Jan 18th 18)

Q180 FMS Resources

Q: Is there a program available that will simulate the FMS for the 2018 season?

A: No, an FMS simulator is not available. For information about how the Driver Station software has features to help simulate a MATCH, click [here](http://wpilib.screenstepslive.com/s/currentCS/m/driver_station/l/144976-frc-driver-station-powered-by-ni-labview). For technical help, please use the [*FIRST* Forums] (<https://forums.usfirst.org/forum/general-discussions/first-programs/first-robotics-competition/competition-discussion/control-system/operator-console-aa>).

(Asked by **23** at Jan 18th 18)

Q181 CIM Motor Mounting Modification

Q: In rule R34, it states that the integral mechanical and electrical system of any motor must not be modified. Does this restrict drilling small holes on the end caps at the same specifications as the mounting holes? For example, if the same diameter holes were drilled at the same depth, but at a 1 inch diameter instead of a 2 inch diameter, in order to mount the motor, this would not be modifying the integral mechanical and electrical system, correct?

A: Drilling holes in a motor casing/cap is modifying the integral mechanical system of that motor (and isn't an exception listed), and is therefore a violation of !R34.

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(Asked by **59** at Jan 19th 18)

Q182 Scale Dimensions?

Q: In the manual do the dimensions for the lowest, highest, and starting positions take the 3.5" plate wall into consideration, or do they only go to the top of the plate? Figure 3-6: Scale Range of Motion

A: The dimensions in Figure 3-6 are measured from the carpet to the top surface of the "Scale and Switch Basket, Plate" (GE-18021). They do not take the PLATE wall into consideration.

(Asked by **2239** at Jan 19th 18)

Q183 Field gaffer's tape

Q: Is there a place for us to purchase the gaffer's tape that is used to mark off the various zones on the game field?

A: There's no specific source defined for the gaffers tape used in assembly and marking of the ARCADE (3M brand tape will ship to Regional events thanks to 3M generous support).

(Asked by **3654** at Jan 19th 18)

Q184 Copper Cladded Aluminum Wire?

Q: In reference to R59. in section 8.7, it says that insulated copper wire is legal to use. Is copper cladded aluminum wire legal to use?

A: **Edited Feb. 13, 2018** ~~No~~*Unless used for SIGNAL LEVEL circuits*, copper or tinned copper is the only wire permitted per !R59. Aluminum and Copper Clad Aluminum wire are not capable of carrying the same current at the same gauge as copper wire.

(Asked by **195** at Jan 19th 18)

Q185 Followon to Q26 - how deep is the POWERUP queue?

Q: Team Update 2 doesn't quite address Q26 IMO. The update to section 4.3 doesn't address this scenario: If the other alliance has a POWEUUP in play, and our alliance presses a POWERUP, it gets queued per 4.3. If we then play our 2nd POWERUP, (with our first in the queue but NOT being played) does it get ignored or queued?

A: Ignored. There can only _ever_ be one POWER UP in the queue.

(Asked by **4048** at Jan 19th 18)

Q186 How does G16 and C07 apply during the ENDGAME?

Q: How would G16 and/or C07 apply if a RED robot was in its null territory near BLUE's platform during the endgame, and the BLUE robot was forced to drive through RED's null territory onto their platform (for example if their teammate had deployed a ramp), and the RED robot while trying to block the BLUE robot from reaching their platform made contact with the BLUE robot in the RED null territory?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Generally speaking, the Red ROBOT has a right to be in the Red NULL TERRITORY, regardless of what is happening in the Blue PLATFORM ZONE.

(Asked by **4334** at Jan 19th 18)

Q187 Null Territory

Q: Is there a time limit for being in either your own or your opponent's null territory?

A: There is no time based limit for being in either NULL TERRITORY. Teams may want to review !G16 when considering strategies involving your opponent's NULL TERRITORY.

(Asked by **4180** at Jan 19th 18)

Q188 H14 - Can Misoriented POWER CUBES Be Fixed in the VAULT

Q: H14: "POWER CUBES may not be removed from the VAULT", and that if removed "re-used within the VAULT" will result in a RED CARD. The field videos showed that the POWER CUBES will only correctly stack 3 high in the VAULT if placed with the FIRST logo facing up or down. If a HUMAN PLAYER places a POWER CUBE into the VAULT in the wrong orientation, can they momentarily remove it and replace it in the same column or will they have to choose between only 2 POWER CUBES or 3 and a RED CARD?

A: Removing a POWER CUBE from a VAULT for any purpose whatsoever is a violation of !H14. The POWER CUBE is considered "in the VAULT" once the lights on the VAULT indicate its presence. With regards to how POWER CUBES will fit, see the blue box in [Section 3.6.3]
(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889766) describing the VAULT. Logo side up is suggested for best fit, as the text overlay on the video states, but it is not necessarily the only way three POWER CUBES can stack in the VAULT.

(Asked by **5881** at Jan 19th 18)

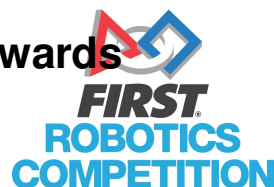
Q189 Q61 indicates that two layers of the same color cloth is not acceptable.

Q: R30-D states that bumpers be covered with a rugged, smooth cloth with multiple layers of cloth and seams permitted. The answer to Q61 indicates that two layers of the same color cloth is not acceptable. Is two layers of different colored cloth that are used to make reversible bumper covers (one red and one blue) acceptable? Please reference robopromo.com Single Reversible Bumper BP-2005 as an example.

A: The answer to !Q61 addresses a specific question in which the two layers of the same color are not required to accommodate !R27. If multiple layers of cloth are used to accommodate !R27 (e.g. 2 or even 3-4 layers in some places that are part of some reversible bumper cloth systems), this is permitted per !R30-D

(Asked by **2832** at Jan 19th 18)

Q190 R03 - Do fasteners on the outside of the frame count towards the measurement of the robot?



Q: R03 doesn't say anything about Fasteners not counting in the Maximum Robot Size. So do fasteners on the outside of the frame count towards the measurement of the robot? Do the fasteners in the Kit of Parts for bumpers count against the size measurements during inspection?

A: **Edited Feb. 13, 2018** ~~Yes~~*Probably not*, !R03 has ~~no~~ exemptions for minor protrusions~~, the entire ROBOT must fit in the size constraints~~. With respect to BUMPER fasteners, please see !R30-G and the Blue Box below !R29 for additional information about determining whether an item is part of a BUMPER or part of the ROBOT (and therefore subject to !R03).

(Asked by **7056** at Jan 19th 18)

Q191 Penalty for causing opponents cube to fall off the scale with incidental scale contact?

Q: If for example there are 2 power cubes on your side of the scale and 6 on the opposing side of the scale and while placing your cube to the scale the robot arm contacts the scale causing 4 cubes to fall from the opponents side and when you place your 3rd cube to take over ownership of the scale. Is there a penalty for this event?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. If a REFEREE believes !G24 has been violated due to your strategy, a violation will be assigned.

(Asked by **5817** at Jan 19th 18)

Q192 Definition of a Pneumatic Piston

Q: We created a pseudo-pneumatic piston by placing a gasket around a 0.5 inch PVC pipe and inserting that into a 1.5 inch PVC pipe so it can be extended by air pressure. Could this be defined as a pneumatic piston and would this be in violation of any rules if we used this in competition?

A: No, home grown pneumatic devices are prohibited per !R81.

(Asked by **818** at Jan 20th 18)

Q193 can robots hang on our robot

Q: when our robot is hanging are we able to have dedicated rungs for our alliance robot to hang on while we are hanging and they are above the one inch line

A: We're not sure what you mean by the "one inch line," but there are no rules prohibiting teams from installing ways to accommodate attachment by partner ROBOTS (provided they don't violate other ROBOT rules), nor are there Game rules prohibiting ROBOTS from supporting partners during the END GAME (provided it doesn't break any other Game rules).

(Asked by **5494** at Jan 20th 18)

Q194 CAW, COTS, And Fasteners Oh My!

Q: Under the rules as written, a pop rivet must be accounted for in our CAW. Here's the logic: According to R10,

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individual COTS items that are less than \$5 USD each are exempt from the CAW. The Glossary states "To be a COTS item, the COMPONENT or MECHANISM must be in an unaltered, unmodified state." When a pop rivet is used in its intended manner for fastening, the item must, by design, be modified. Is the intention of the rule for us to count these in our CAW?

A: Good catch. It was not our intent for teams to be required to list fasteners that become modified during installation on the CAW. Please see [Team Update 5]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate05.pdf>)

(Asked by **422** at Jan 24th 18)

Q195 Rung clarification

Q: Rung definition states "1 1/4in. Schedule 40 aluminum pipe". Since Schedule 40 aluminum pipe is usually ordered based on inside diameter, please advise; is the 1 1/4" in the outside diameter or inside diameter?

A: The 1 1/4 in. dimension refers to the nominal inside diameter of the pipe.

(Asked by **1075** at Jan 20th 18)

Q196 G05 Mechanical extension past 16" constrained to no more than 16" through programming

Q: During the non-endgame, if our robot can mechanically extend more than 16" laterally, but through programming, we constrain it from extending past 16", would that meet G05?

A: For sure.

(Asked by **6131** at Jan 20th 18)

Q197 Can you connect an external power source, to lower the robot after the match?

Q: If a team designs a climbing mechanism that won't back drive, but wishes to lower their robot after the match before picking it up, will they be allowed to externally power the lifting motor?

A: Nope. Please see !G08.

(Asked by **5030** at Jan 21st 18)

Q198 Using air to release end game structure

Q: Is deploying support structures at the end of the game meant to carry other robot by venting out stored compressed air legal?

A: We cannot comment on design legality. However, if you are asking if a ROBOT can vent pressurized air during a MATCH, the answer is yes. If this doesn't answer your question, please consult [Section 1.8]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

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(Asked by **868** at Jan 21st 18)

Q199 Auto-Run Interaction

Q: In Rule G17, it mentions that " ROBOTS may neither fully nor partially strategically support the weight of partner ROBOTS" unless during the End Game. However, if a robot pushes another robot on their own alliance to cross the Auto Line, would this violate that rule? For example, Red alliance A has an autonomous program that can assist Red alliance B to cross the Auto Line by pushing their robot. Would that be a violation?

A: Pushing or pulling (i.e. applying force in only a horizontal vector) is neither fully nor partially supporting the *weight* of a ROBOT.

(Asked by **59** at Jan 21st 18)

Q200 Number of alliance team members?

Q: This statement: During each FIRST® POWER UPSM MATCH, two ALLIANCES (cooperatives of up to four (4) FIRST® Robotics Competition Teams) play out a multiplayer video game to defeat the boss by gaining OWNERSHIP of a SCALE and SWITCHES by tipping them in their favor or by using POWER UPS. The above statements states that there could be up to 4 four teams in an alliance. Is this for playoffs only or is this a typo?

A: Most of the time ALLIANCES have three (3) teams, however there are occasions where an ALLIANCE will call a BACKUP TEAM for a Playoff MATCH, resulting in a four (4) team ALLIANCE. The use of the phrase "up to" is meant to accommodate that.

(Asked by **3036** at Jan 21st 18)

Q201 Robot over platform for successful climb

Q: For a climb to count, does a robot have to be above the platform?

A: Apologies, we're not sure we understand your question. In order for a ROBOT to be awarded CLIMB points, per Table 4-1, it must be "fully supported by the SCALE (either directly or transitively) with BUMPERS fully above the BRICKS at T=0, not in direct contact with their PLATFORM, and not at all in the opponent's PLATFORM ZONE."

(Asked by **4909** at Jan 21st 18)

Q202 Legal length for battery wire?

Q: What is the legal length for battery wire on the robot?

A: There is no specified maximum length for battery cables; however, to be exempt from the ROBOT weight, the battery must have no more than 12 in. of cable per leg as specified in !R05-B.

(Asked by **195** at Jan 21st 18)

Q203 Using a check valve

Q: Rule 83 part G allows check valves. We plan to connect one output from each of two pneumatic solenoid

valves to the inputs of a check valve and connect the output of the check valve to a pneumatic cylinder. Does this configuration pass rule 96?

A: No, the output of two pneumatic solenoid valves may not be plumbed together per !R96.

(Asked by **6072** at Jan 21st 18)

Q204 Is the use of Plexiglass (acrylic) on ROBOTS legal?

Q: R08 states that ROBOT parts shall not be made from hazardous materials, be unsafe, cause an unsafe condition, or interfere with the operation of other robots. There were concerns about using acrylic because of it's tendency to splinter instead of bend, like polycarbonate, however it could be used in low-stress scenarios such as aesthetics with little risk of breaking. Would those uses be compliant with R08 and any other applicable rules?

A: We cannot rule absolutely on hypothetical ROBOT designs or components, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Acrylic is not necessarily an unsafe or hazardous material, however there are certainly usages that may have a high likelihood of becoming unsafe and therefore violate !R08.

(Asked by **5468** at Jan 21st 18)

Q205 Clarification on R100 D

Q: Can we place driving simulator pedals on the floor in the driver station? Does it violate R100 D?

A: There are no specific prohibitions against pedals or other floor-based user input devices. However, please note that the OPERATOR CONSOLE has specific size constraints, cannot attach to the ARCADE (per !R100-D as updated in [Team Update 5] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate05.pdf>) and !G19, with exceptions as noted), and can't cause an unsafe condition (anything that is likely to cause a trip hazard will be scrutinized by Event Staff and, per the introductory language in [Section 5 Safety] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889779), could be deemed a hazard). Also, there is FIELD Management System hardware and wiring below the shelves (as described in [Section 3.6.1 PLAYER STATION] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889764)) that may interfere with your plan and cannot be moved/rearranged by or for a team.

(Asked by **2543** at Jan 24th 18)

Q206 Cubes in between a switch and the switch's fence

Q: If a ROBOT places a POWER CUBE (either intentionally or unintentionally) in the middle area of the SWITCH between the two SWITCH PLATES surrounded by the FENCE, would it violate rules G20, G22, G24, & G25? To follow up, would taking a POWER CUBE from that area violate rule G25? We're aware of violations in the event a ROBOT affects the balance of the SWITCH or if other POWER CUBES are nudged out of place or off a PLATE. However, if a POWER CUBE is already in that zone, is it fair game to take?

A: Regarding !G20: This is circumstantial and a REFEREE will evaluate if the the action was deliberate and if the POWER CUBE is easing or amplifying the challenge. Regarding !G22: Without another POWER CUBE as part of the question, we can't see how this rule applies. Regarding !G24: This is circumstantial and a REFEREE will

evaluate if the action was preceded by a ROBOT strategically removing the POWER CUBE from a PLATE. Regarding !G25: Without any reference to movement of a PLATE by anything other than a POWER CUBE, we can't see how this rule applies. Regarding the follow up: Without any reference to movement of a PLATE by anything other than a POWER CUBE, we can't see how !G25 applies. There are no rules prohibiting a ROBOT from retrieving a POWER CUBE from inside the FENCE.

(Asked by **4201** at Jan 22nd 18)

Q207 Can pool noodles be bent around corners of the frame perimeter?

Q: R30C states that pool noodles may not be deformed, and R31 states that corner joints must be filled with pool noodle material. Does bending pool noodles around corner joints count as deformation for the purposes of R30C and if not, would a 90 deg bend sufficiently fill the corner with pool noodle material? Or, without referencing a design: Does R30C apply to pool noodle material used to fill corners? Does R31 prohibit the use of compressed pool noodle to fill corners? How full is full for R31?

A: There are no rules that prohibit wrapping pool noodles around a corner, provided the cross-section of the BUMPER isn't significantly altered (per !R30-C, for example if there's a gap introduced between the pool noodle and the backing).

(Asked by **199** at Jan 22nd 18)

Q208 Bumper corner brackets must be made of aluminum?

Q: R30-F allows the use of aluminum brackets to attach BUMPER segments to each other (e.g. at corners as shown in Figure 8-5). Are brackets made of materials other than aluminum, for example steel, allowed? Are they allowed if the brackets also serve as part of the rigid fastening system permitted by R30-G?

A: !R30, part F, makes no allowance for brackets made from material other than aluminum. There are no restrictions on material used to meet the requirements of !R30, part G.

(Asked by **199** at Jan 29th 18)

Q209 Kit of parts and CAW

Q: We are a second year team so I was wondering if KOP items we received last year and used again this year are still exempt from the CAW? Such as CIM motors, Spark motor controller, and the roboRIO?

A: Yes, per the definition of Kit of Parts... "the collection of items listed on any Kickoff Kit Checklists, distributed via *FIRST®* Choice, or paid for completely (except shipping) with a Product Donation Voucher (PDV)." There is no requirement that says the part has to have been distributed for the 2018 season.

(Asked by **6628** at Jan 22nd 18)

Q210 Exchange opening clarification

Q: Game Season Manual and Kickoff Field photos indicate that the openings to the Exchange are on the left side of the 48-inch wide panel, when facing it from the Field. Field Drawing GE-18100 also indicates Red Alliance

Exchange is on the left when facing it from the Field; leading us to believe Blue Alliance is the same. (Field Drawing GE-18010 is rather vague on the matter.) Team Drawings TE-18001 indicate it to be on the right side when facing it from the Field. Which is the correct side?

A: Thank you for your question. The openings in the Exchange will always be biased toward the left side of the EXCHANGE panel, as viewed by a ROBOT'S perspective when in the FIELD, regardless of if the ROBOT'S approaching the Red or Blue EXCHANGE. TE-18001 is incorrect and fixed as of [Team Update 5] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate05.pdf>); please accept our apologies!

(Asked by **1153** at Jan 24th 18)

Q211 Wide robots with established position

Q: According to R4 a robot is able to expand to be as wide as 65 inches (33+16+16). These extended robot parts are likely above the 7½" bumperzone meaning during contact, the extended robot parts could go into their opponents FRAME PERIMETER. G11 has a warning against initiating contact with these extended robot elements, but it is unclear if a team with a wide "blocking bot" occupying a legal strategic position would still draw a penalty if this contact is initiated by the other side's robots.

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. !G11 specifically uses the term "Initiating"; if a ROBOT is not determined to be responsible for "Initiating" contact, it would not be subject to violation of !G11.

(Asked by **2834** at Jan 23rd 18)

Q212 R61 All non-SIGNAL LEVEL Wire Color

Q: Does "(ie. except for outputs of relay modules, motor controllers, or sensors)" mean that the color/polarity reservations of the wire only apply to the input side of the modules and motor controller. Then can the Outputs of the modules be Black and Blue? These colors are reserved for only the negative polarity (R61.B) on the input side between the PDP and module.

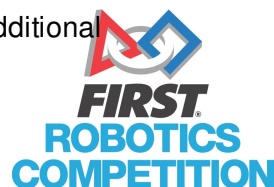
A: The wires described are wires that do not retain constant polarity and are therefore exempt from the wire coloring requirements of !R61. These wires may be any color.

(Asked by **3244** at Jan 23rd 18)

Q213 Support of Team Drawings Scale Tower via Outriggers

Q: The Team Drawings version of the scale does not currently have a support bar from the base of the tower to the outrigger, as it does on the competition field. Should this be added to the Team Drawing Scale to prevent the outriggers from getting pushed away from the Tower, allowing it to fall over when a team tries to climb the side of the rung.

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. Additional comments or suggestion should be directed to [firstroboticscompetition@firstinspires.org] (<mailto:firstroboticscompetition@firstinspires.org>)



(Asked by **2994** at Jan 23rd 18)

Q214 Can a patch of the same color be sewn to the in or out side of the bumper to repair a tear

Q: Q61 and Q189 ask about multi layers on the bumper and Alliances . The blue box below R30D states that tape of the same color can be used to temporary repair a bumper. Does a team have to completely replace the bumper cover or can they glue fabric and/or sew a patch to the inside of the cover to make a more permanent repair. Part two If you anticipate a where point can you apply the patch to the bumper before damage occurs as long as the "cross section in Figure 8-6 is not significantly altered"

A: Applying a patch to repair a hole in a BUMPER would be permitted (including potential overlaps and seams) as this would be necessary to cover the pool noodle and comply with !R27. Re-enforcing a BUMPER using additional layers of cloth, not needed to accommodate !R27, prior to any damage occurring is not permitted (and suggests that the cloth chosen may not be sufficiently rugged).

(Asked by **3244** at Jan 23rd 18)

Q215 Inflatable bag

Q: Our team is considering a device that would use a bag inflated to a very low pressure (1-2 psi at the most) by a blower, separate from the pneumatic system. The blower is a COTS device, similar to a West Marine Model 13855028, and is not capable of producing significant overpressures. Will this be allowed, or is it going to be considered a pneumatic device and be subject to the rules for such devices?

A: A device which utilizes contained air under pressure meets the definition of a pneumatic device (with the exception of items B and C in the !R83 Blue Box, which are pneumatic devices by this definition, but are specifically exempted) and would not be permitted if it does not meet the restrictions specified in [Section 8.9 Pneumatic System]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889797)

(Asked by **191** at Jan 23rd 18)

Q217 Follow up question to Q184; Copper Cladded Aluminum Wire

Q: If we were to go up from 6 gauge to 4 gauge using the Copper Cladded Aluminum Wire, would we be able to use it for our battery leads and main braker? This change would provide more current than the 6 gauge copper wire. The 4 gauge Copper Cladded Aluminum wire is rated at 10 amps more than the 6 gauge.

A: **Edited Feb. 13, 2018** No. Copper wire is the only wire allowed *for non-SIGNAL LEVEL circuits* per !R59.

(Asked by **195** at Jan 23rd 18)

Q218 Minimal age requirement for the drive team

Q: We have a 13 years old student in our team that want to try out for the driver spot on our drive team. Is there any restrictions or rules related to a minimal age for a drive team member ?

A: While *FIRST* Robotics Competition is designed for students in High School, there are no minimum age

requirements set by rules. Teams make their own decisions in this regard.

(Asked by **5528** at Jan 23rd 18)

Q219 Shuttle valve

Q: We propose to feed two directional control valves at two different pressures into to a shuttle valve also referred to as an "OR" valve (SMC part number VR1210-N010). The proposed shuttle valve allows the directional control valve with the higher pressure to flow into an air cylinder, simultaneously blocking flow from the lower pressure feed. Our opinion is that the final element being a passive shuttle valve would not violate or circumvent the purpose of rule R96. Would this be permitted?"

A: Yes, the use of a shuttle valve, or other mechanism, which prevents the outputs of the solenoid valves from ever being connected simultaneously complies with !R96.

(Asked by **6072** at Jan 24th 18)

Q221 Pneumatic Linear Actuator Labeling

Q: Are only items explicitly marketed/labeled as a "pneumatic cylinder", "pneumatic linear actuator", or "rotary actuator" allowed per rule R83 J? For example, McMaster-Carr part 9538K25 is called an "adjustable air spring", but it is fundamentally a COTS pneumatic linear actuator.

A: Yes, a COTS item must be sold by the VENDOR as that item in order to be considered that item. For the purposes of the *FIRST* Robotics Competition, air springs are not cylinders.

(Asked by **4183** at Jan 24th 18)

Q222 player station

Q: At page 26, rule 3.6.1, in player station section it is said that; "One 120VAC NEMA 5-15R power outlet: located on each PLAYER STATION shelf and protected by its own 2-Amp circuit breaker. It can be used to power the OPERATOR CONSOLE. DRIVE TEAMS are responsible for monitoring their power consumption as a tripped breaker in the outlet does not constitute an ARCADE fault. " Can international teams use 220 V outlet in their local style?

A: If you are asking if the standard 120VAC PLAYER STATION outlet will be changed by *FIRST* to 220V outlets for international use, the answer is no. ARCADES are standardized to help ensure quality. Also, teams may not modify the ARCADE themselves, but converters may be used downstream from the PLAYER STATION'S 120V outlet, provided those converters do no damage the ARCADE, as this would be a violation of !G19.

(Asked by **2905** at Jan 24th 18)

Q223 Are gas springs legal?

Q: We couldn't find a definite answer to this question on the manual. Are gas springs, the type that is used on vehicles, legal to use?

A: We cannot rule absolutely on specific ROBOT components, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Please see the Blue Box below !R83.

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(Asked by **1574** at Jan 24th 18)

Q225 G23 and Transitive Contact

Q: In the reading of G23, it states that "A POWER CUBE removed through transitive contact with another POWER CUBE and/or an opponent ROBOT is a violation of this rule." Would the transitive contact clause apply if, for example, a blue ROBOT intentionally pushes a red ROBOT through the blue POWER CUBE ZONE, resulting in the red ROBOT incidentally removing all of the POWER CUBES for a total of 50 FOUL points?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Keep in mind that if the strategy of an ALLIANCE/Team is to force another ALLIANCE/Team to violate a rule (such as pushing them through the POWER CUBE PILE), they may be subject to !C07 (and therefore, no violation on the ROBOT being pushed)

(Asked by **422** at Jan 25th 18)

Q226 Operator Console Depth

Q: R100 B states that the Operator Console must not be more than 14 inches "deep." Does this dimension relate to the 12" shelf that the operator console is placed on, so that the operator console may only extend up to 2" past the edge of the shelf?

A: No. The total depth may not exceed 14 inches per !R100-B, but it is not a requirement to utilize the full depth of the shelf. For example, an OPERATOR CONSOLE only utilizing 10 inches of the shelf could extend 4 inches past the edge of the shelf. Don't forget about the hook-and-loop tape, which can be useful for securing your OPERATOR CONSOLE.

(Asked by **6032** at Jan 25th 18)

Q227 Driver Station GPS

Q: Can a driver station *receive* communications from GPS? GPS doesn't broadcast. Or is that in violation of R101?

A: GPS is considered wireless communication, and thus a violation of !R101.

(Asked by **6619** at Jan 25th 18)

Q228 G09B - How is "nearest" defined for launching?

Q: G09B. - "when any part of its BUMPERS are contacting a FENCE, and it's attempting to place a POWER CUBE on the nearest PLATE of that FENCE's SWITCH" How is "nearest" going to be determined? Is this nearest plate to the cube before it is launched? Nearest plate to the bumper contact point(s) with the fence? Nearest plate to the center of the robot? Nearest plate closest to the center of the lexan panel the robot is touching? The graphic depicts robots able to score in multiple plates.

A: As stated in !G09 and its blue box, the evaluation is based on the position of the BUMPERS. If the BUMPERS are "straddling the midpoint (i.e. BUMPERS in both halves of the FIELD)" the ROBOT may launch to either of the corresponding SWITCH'S PLATES. If the ROBOT is not straddling the midpoint, the BUMPERS must, therefore,

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be closer to one of the PLATES (and that is the only PLATE at which they are permitted to launch).

(Asked by **3847** at Jan 25th 18)

Q229 Final Scorecard Information

Q: What is the information that will be displayed in the final scorecard after each match? ex. last year the final scorecard displayed a points breakdown for rotors, takeoff, pressure, etc

A: The detail that will be provided on the Audience Screen has not been published yet. Stay tuned to the [FRC Blog](<https://www.firstinspires.org/robotics/frc/blog/>) to see detail.

(Asked by **4976** at Jan 29th 18)

Q230 Active POWERUP Indication

Q: Will there be any indication that a POWERUP is, or was, in play other than the lights around the scale and switch? ex. indicated in the final score card

A: Detail about POWER UP indicators has been published in [Section 3.5 PLATE Lighting] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889762) and [Section 3.6.3.1 VAULT Lighting] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889766). If any additional information is published (e.g. content for the Audience Screen), it will likely be in the [FRC Blog] (<https://www.firstinspires.org/robotics/frc/blog/>).

(Asked by **4976** at Jan 29th 18)

Q232 Only Relay Allowed Discontinued?

Q: R35b states that the only relay allowed is Spike H-Bridge Relay (P/N: 217-0220 and SPIKE-RELAY-H). However, it is discontinued according to the Vex Robotics website. Is there an alternative or equivalent part we can use?

A: Yes, there are other devices/ways a team can control an actuator, but this Q&A is not intended for technical assistance or support. For technical advice or help on how this can be done, please use the [*FIRST* Forums] (<https://forums.usfirst.org/forum/general-discussions/first-programs/first-robotics-competition/competition-discussion/control-system>). Note that !R33 only restricts control devices for actuators, other relays may be used for control of non-actuator devices as part of CUSTOM CIRCUITS.

(Asked by **5710** at Jan 26th 18)

Q233 Power ups systems for uses

Q: In a prior question about power ups you answered that if a power up is activated and the other team presses the power up it is ignored, does that mean the alliance needs to re hit the power up after the other power up is done?

A: We suspect you're misunderstanding the response to !Q147. [Section 4.3] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889775) says that "if an ALLIANCE pushes the button for FORCE/BOOST while _their_ other FORCE/BOOST is active,

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the button press is ignored." ****not**** "if a power up is activated and the _other team_ presses the power up it is ignored" (emphasis added). Please review [Section 4.3] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889775) for rules about playing and queuing of POWER UPS, and resubmit another question if necessary (and please include question numbers if referenced - thank you!).

(Asked by **3692** at Jan 26th 18)

Q234 PWM splitting

Q: Is it legal to use one pwm port with a Y splitter to run two motor controllers (talons) and two motors(CIMs). Each motor would have its own controller but the controllers receive the same signal from one pwm port by using a splitter. The controllers would not see any increase in load since there is only one motor per controller.

A: Yes, this complies with !R74.

(Asked by **5032** at Jan 26th 18)

Q235 Power Cube sensing in the VAULT

Q: Is there a specific time delay before a Power Cube is sensed and confirmed to be in the VAULT before illuminating the appropriate indicator light? As indicated in Q188, "The POWER CUBE is considered "in the VAULT" once the lights on the VAULT indicate its presence." Do Power Cubes need to be inserted in the VAULT individually to illuminate one light at a time per Power Cube (3.6.3.1) or can stacks of two or three be inserted in a column at the same time?

A: There is no rule requiring the POWER CUBES to be inserted into the VAULT individually, only !H14 regarding the removal of POWER CUBES from the VAULT. Generally speaking, it takes approximately one (1) second between when a POWER CUBE is fully inserted into the VAULT, and when the corresponding indicator light will illuminate. Keep in mind that when a POWER UP is played, it is played at the level indicated on the lights (e.g. if two POWER CUBES are in the FORCE column, and you add a third, but press the button before the third light illuminates, the FORCE POWER UP will be played at level two)

(Asked by **6153** at Jan 26th 18)

Q236 Week 0 FMS data stream for scouting app testing

Q: We are wanting to test our scouting app and saw there was a Week 0 event hosted last year that provided live stream data from FMS. Is that planned again for 2018? Where will we find that datastream if it is being hosted?

A: The **intent** is to have the FMS data stream available via the API for the official Week 0 event, but we cannot guarantee this feature will be available.

(Asked by **2733** at Jan 29th 18)

Q237 Are visible bumper cover fasteners limited to snaps and hook/loop?

Q: R27B allows hook and loop fasteners and snap fasteners backed by the hard parts of the bumper to be visible

when the bumpers are installed on the robot. Is this meant to exclude other fasteners similar to snaps, such as twist-lock fasteners?

A: Yes, the only fasteners permitted to be visible on the BUMPER when installed are those specifically called out in !R27-B.

(Asked by **2915** at Jan 26th 18)

Q238 About Chairmans Video

Q: Hi we are the FRC team 6025. We are joining to the Iowa Regional Competition. We just wanted to ask if we must submit the chairmans video at 8 February or can we bring the video with us to the competition without an online submission.

A: Hi, please see the "Interview Process and Video Requirement" section on the Award Submission Information webpage: [<https://www.firstinspires.org/resource-library/frc/submitted-awards>] (<https://www.firstinspires.org/resource-library/frc/submitted-awards>) You'll just bring it with you to the competition. Good luck!

(Asked by **6025** at Jan 26th 18)

Q239 Stored energy in Springs?

Q: Is is legal to have energy stored in springs that are used for steadying a structure from an under mount?

A: Yes, see !R45-C.

(Asked by **6538** at Jan 26th 18)

Q240 Contained Air (Q215 follow up)

Q: If devices with CONTAINED air are classified as pneumatics, what about something like a bag with air being blown into it through a large diameter pipe when the air is not contained (with a valve or flapper or other solid device)? There is a gap between the output of the blower and the opening of the pipe, so the momentum of the air provides force, but the air is not contained. If the blower stops or air flow is interrupted, the whole system will return to atmospheric pressure.

A: If the air is not contained, the device does not meet the definition of a pneumatic device and would not be governed by the rules in [Section 8.9 Pneumatic System] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889797).

(Asked by **191** at Jan 26th 18)

Q242 R23 for U shaped robot

Q: For a U shaped robot, what is the difference between a frame perimeter side and a frame side? By R01, we would think that, for example, a three inch edge of a U shape would only need three inches of bumper. In the answer to Q179, you said Figure 8-2 does not show any frame perimeter sides less than six inches, so we are wondering about robots that have sections of the U shape that are less than six inches. Would they need six inches of bumper or not?

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A: As described in the Blue Box of !R01, the FRAME PERIMETER can be determined using the "string test" of wrapping a taut string around the ROBOT. For a U-shaped ROBOT, the string would cut across the legs of the U, not go down in between, resulting in a single FRAME PERIMETER side (which is greater than 6" in the case of Figure 8-2 and therefore needs 6" protection from each corner). If a FRAME PERIMETER side is shorter than 6", that side must be fully protected by BUMPER per !R23 and as illustrated in Figure 8-3. So BUMPER segments less than 6" are appropriate in those situations.

(Asked by **1280** at Jan 29th 18)

Q243 Getting assigned plates at start of match

Q: According to the manual, section 3.10 (The FIELD Management System), we can get the assigned plates (left or right) at the beginning of a match. It appears that we will call `DriverStation.getInstance().getGameSpecificMessage()` to get a string telling us our assigned plates. What is the format of that returned string? Is it of the form "lrl" where the first character indicates the side of our near plate, second character is for the scale, and third character is the far plate?

A: Details about what the FMS sends to the Driver Station are included in [this article] (http://wpilib.screenstepslive.com/s/currentCS/m/getting_started/l/826278-2018-game-data-details). The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP, so for technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **4176** at Jan 28th 18)

Q244 Auton Null zone rule

Q: Can we enter the null zone in auto period and want is the outer limit? Is the farthest black line on the floor the border, or is the middle line (or cable line) the limit? Example: We want to put a power cube on our side of the scale. Can we go to the middle of our null zone, or do we have to do it off the side. The rules state "no part of the robots bumper can not go into the opponents zone". SO where does the opponents zone start?

A: Rule !A04 states that the ROBOT can not "pass from the NULL TERRITORY to the opponent's side of the FIELD," which is the space beyond the NULL TERRITORY. For detail about what makes up various areas of the FIELD, we believe [Section 3.1 Zones and Markings] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc504747473) has the detail you seek (specifically, see description of NULL TERRITORY and Figure 3-2).

(Asked by **3534** at Jan 29th 18)

Q245 Clarification on R100 B

Q: R100 states that the OPERATOR CONSOLE must not be deeper than 14 in. excluding items that are 'held' or 'worn'. Suppose we wanted to use a device that detects feet being pressed on the floor; this naturally must lie on the ground. Would attaching straps so that the device could be partially supported by the wearer's shoulders satisfy the definition of 'worn', thus excluding the device from the depth restriction?

A: No. 'Held' or 'worn' in !R100 means the device must be fully supported by the DRIVERS.

(Asked by **2191** at Jan 29th 18)

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Q246 Length vs. Width

Q: According to the text in 3.3.1 Scale Plates, the plates are 3 feet wide by 4 feet deep. When looking at figure 3-7, it shows that the depth is 3 feet and the width is 4 feet. The same applies to the switch in 3.4.1 and figure 3-14. Can we please get clarification on which dimension is correct?

A: Throughout the manual the 3 ft. dimension of the PLATE is considered the PLATE'S width. The images don't label the dimensions as "length" or "width" (although the audience may infer a "width" and "depth" based on how they're approaching the PLATE), so there's no identified conflict.

(Asked by **6574** at Jan 29th 18)

Q247 Servo Connection Clarification

Q: R37 specifies that servos can only be connected to 3 things -- roboRIO PWM, WCP Spartan PWM, or REV Servo Power Module. However, R74 seems to say that legal MXP boards' (listed in R75) PWM connections may also be used for servos. Can servos be connected to PWM ports on all of the MXP boards listed in R75, or only to the WCP Spartan board?

A: !R74 refers to "servo controllers" (i.e. the REV Servo Power Module). Servos may only be connected to the three legal locations specified in !R37. The other legal active MXP boards are not designed to power servos from those ports.

(Asked by **1986** at Jan 29th 18)

Q248 Can we swap out Drivers/Coaches/Technicians?

Q: Can the drive team change between matches? That is to say, can the coach of one match be a driver in the next, or the technician of one match be a coach in the next?

A: There are no rules prohibiting changes of DRIVE TEAM members between MATCHES. That being said, make sure each person has the right button (!H05) for their role and meets the requirements prescribed in [Section 4.5 DRIVE TEAM]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc504747500).

(Asked by **5212** at Jan 29th 18)

Q249 Clarification on control being transitive

Q: If robot A pushes robot B such that multiple cubes are "controlled", would this violate G22, and if so what team would be in violation? Side note: if neither robot is holding any cubes, could robot A push robot B such that robot B "controls" two cubes?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **5212** at Jan 29th 18)

Q250 Are POWER CUBEs counted when a POWER UP is played or

when it becomes active?

Q: If the opposing ALLIANCE has an active POWER UP, we have one POWER CUBE in the FORCE column of our VAULT, and we push the button for FORCE, our POWER UP will be queued. If we add a second cube to the FORCE column of our VAULT while our POWER UP is queued, will our FORCE POWER UP become active at level 1 (we earn OWNERSHIP points from our SWITCH) or level 2 (we earn OWNERSHIP points from the SCALE)?

A: POWER UPS are queued based on the level at the time the button was pressed. In your example, level 1.

(Asked by **20** at Jan 28th 18)

Q252 Feeding cubes out of the portal

Q: Are human players allowed to push a cube only partway out of the portal? Could they leave only half of the cube sticking out of the wall. This would leave the cube available to be plucked off the wall by a robot.

A: There are no rules that prohibit this.

(Asked by **386** at Jan 29th 18)

Q254 Clarification of A03 and Control Devices

Q: A03 refers to control devices. If a device can't at any time influence the data sent from the driver station to the robot or alter robot behavior in any way, but is connected to the driver station, does it constitute a control device?

A: Yes. As clarified in [Team Update 7]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate07.pdf>), all devices connected to the OPERATOR CONSOLE are considered control devices as REFEREES are not expected to differentiate between devices which can or cannot control the ROBOT.

(Asked by **900** at Jan 30th 18)

Q255 12v Electric Winch COT Clarification

Q: Would a 12v electric winch, linear actuator, or any mechanism be considered a COT and illegal if disassembled and reassembled by the team after delivery. For example this 12v winch. (https://www.reese-hitches.com/products/Trakker_ATV_Utility_Winch,KT-2000).

A: We can't comment on the legality of specific COTS items. However, purchasing a COTS item, disassembling it, then re-assembling it just as it was does not change whether or not it was legal in the first place, and it would still be considered COTS. A COTS item disassembled, modified (for example, by changing a motor), then reassembled makes the item no longer COTS (though not necessarily legal or illegal). Also, please keep !R33 in mind regarding legal motors and actuators. Any COTS item using a motor or actuator not listed in !R33 is not permitted. If this doesn't answer your question, please rephrase and ask again.

(Asked by **1303** at Jan 30th 18)

Q256 Is there a limit to a pneumatic cylinder bore and/or stroke?

Q: Is there a limit to a pneumatic cylinder bore and/or stroke (R83)?

A: No, there is no limit to cylinder bore and/or stroke.

(Asked by **5567** at Jan 30th 18)

Q257 GoPro on a separate receiving computer

Q: Are we allowed to put GoPro's on our robot and have the stream going to a separate computer other than the computer controlling the robot?

A: No, please see !R69.

(Asked by **1799** at Jan 30th 18)

Q258 Budget Question. Do I need to assign a price on CAW for scrap material from a sponsor?

Q: We are getting scraps of titanium donated by our sponsor, so we are basically going to be able to make our whole robot out of titanium without spending any money on it. It is also material that the company would not be selling, therefore there is not a fair market value that we could use. Do I need to mention this material on CAW in some way?

A: !R13 requires you to include on your CAW the fair market value of the donated material. Even if the donating party does not normally sell the item, you should be able to find some reasonable comparable product to price out in the open market, and that is the pricing to use on the CAW. Be ready to explain your pricing to the Inspectors.

(Asked by **6957** at Jan 30th 18)

Q259 Bumper hardware and BUMPER ZONE

Q: For the purposes of R24, is bumper mounting hardware(that exists behind and above the plywood backing) considered part of the BUMPER during BUMPER ZONE measurement?

A: It depends, if the element is part of the BUMPER it must be located within the BUMPER ZONE; the Blue Box in !R29 offers guidance which applies to !R24 as well.

(Asked by **5012** at Jan 31st 18)

Q260 Is an COTS Air Spring Legal?

Q: In Q221, you stated that, for the purposes of FRC, an air spring is not considered a cylinder. Would a COTS air spring be considered a pneumatic linear actuator and, if it met all other requirements for pneumatic system components, be legal for use on a robot?

A: If the VENDOR defines their COTS air spring as a "linear actuator," it's legal per !R83-J.

(Asked by **4103** at Jan 31st 18)

Q261 Placement of robots on the field at the start of the match

Q: Section 3.6.1 of the game manual titled "PLAYER STATION" states that "A PLAYER STATION is one (1) of three (3) assigned positions in an ALLIANCE WALL from where a DRIVE TEAM operates their ROBOT". Does this mean the robot has to be placed within a specific boundary in accordance to each PLAYER STATION during match setup or can the robot be placed anywhere as long as the bumper is touching the 3 ft tall diamond plate panel base (end panel)?

A: !G01 covers the criteria that must be met for a ROBOT about to start a MATCH (you reference bullet E, but there are others), and does not require the ROBOT be aligned with the Teams assigned PLAYER STATION.

(Asked by **4123** at Jan 31st 18)

Q262 Power Cube Switch Placement

Q: According to section 4.1.2, the six cubes placed along the edge of the SWITCH are placed approximately equidistant from each other, however, it makes no mention whether this distance is standardized. Judging from ARCADE diagrams and CAD models, it appears each power cube nearest the short edges of the SWITCH is placed in line with the short end of the SWITCH. Is there a standard as described by the GDC for field resetters to place the edge POWER CUBES to?

A: The POWER CUBES along the SWITCH FENCE will be staged as shown in Figure 4-2 such that they're approximately equidistant from each other.

(Asked by **1982** at Jan 31st 18)

Q263 Further clarifications for R24 and G07

Q: This is a follow up to Q4, Q39 and Q8. Suppose a robot has a rigid mechanism that is articulated so that whenever the robot is placed on a flat surface, it complies with R24. (E.g. a wheel on a suspension or a ramp mounted with a hinge) When the robot is on uneven ground, the mechanism is more than 7.5" below the top of the bumpers. Does this violate G07?

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. That being said, if the ROBOT complies with !R24 when standing normally on a flat floor per !R24's Blue Box, then BUMPER ZONE criteria are met.

(Asked by **6423** at Feb 1st 18)

Q264 Number of CTR Electronics Voltage Regulator Modules

Q: Our electronics team would like to know if more than one CTR Electronics Voltage Regulator Modules can be used on the robot?

A: There are no rules that explicitly limit the number of VRMs that may be used on a ROBOT.

(Asked by **4056** at Feb 1st 18)

Q265 Protrusions beyond the frame permimeter

April 28, 2018

Q: If a robot has a frame perimeter of 28" x 33" and there are bolt heads that protrude beyond the 28" or 33" dimension, will a robot with the measurements listed above be allowed to compete? Will the conditions listed above cause the robot to fail inspection?

A: **Edited Feb. 13, 2018** ~~A ROBOT with any part (including minor protrusions, excluding BUMPERS) outside the dimensions listed in !R03 when it's in STARTING CONFIGURATION does not comply with !R03 and will not pass Inspection.~~ *Per !R03, minor protrusions permitted in !R01 and !R02 (that are less than ¼ in. (~6.3 mm) such as bolt heads, fastener ends, weld beads, and rivets) are exempt from the 33 in. and 28 in. limits.*

(Asked by **4909** at Feb 1st 18)

Q266 R33: Definition of a legal automotive door motor

Q: Is any motor that is marketed for use in or with an automotive door considered a legal automotive door motor? If not, what is considered a legal automotive door motor?

A: Yes, any motor marketed for use in or with an automotive door is an Automotive Door motor permitted per !R33.

(Asked by **1619** at Feb 2nd 18)

Q267 Pneumatics in Setup

Q: Before the match, during robot setup, can we use stored air pressure to manually operate a pneumatic cylinder? The purpose is to grip a power cube before the beginning, so it is fully supported by the robot.

A: There are no rules that prevent this, but how it's done is governed by a few (e.g. !G02, !G08, and those in [Section 8.9] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc504747520)).

(Asked by **4765** at Feb 2nd 18)

Q268 Do cubes placed in the exchange have to go directly to the vault or back to a robot?

Q: When the human player at the Vault receives a cube, does he have to place it directly into the vault or immediately feed it back to a robot? Can the Power Cube be held in reserve for later play (without placing into the vault or returning it to a bot)?

A: There are no rules that require an ALLIANCE to do anything with POWER CUBES in the ALLIANCE STATION.

(Asked by **5623** at Feb 2nd 18)

Q270 POWER CUBE Placement Along SWITCH

Q: Following-up to Q262, I'm asking whether the placement of POWER CUBES is guaranteed to be lined up along the two short edges of the FENCE. Sector 4.1.2 (and accompanying Figure 4-2) show that cubes are going to be placed "Approximately Equidistant", however it makes no mention of the cubes being placed against the switch edge like is shown in Field Tour Videos, the Game Manual Images and CAD Files. Can a team request that

these cubes be placed along the edge, assuming the cubes are kept equal?

A: As stated in IQ262, POWER CUBES will be staged approximately as shown in Figure 4-2. It's not guaranteed that POWER CUBES perfectly line up with the short edges of the FENCE. Requests from TEAMS for exact placement will be declined.

(Asked by **1982** at Feb 2nd 18)

Q271 Minor protrusions in R01 and R02 clarification

Q: In answer to Q265 you state "A ROBOT with any part (including minor protrusions, excluding BUMPERS) outside the dimensions listed in R03 when it's in STARTING CONFIGURATION does not comply with R03 and will not pass Inspection." This seems to contradict R02 which does allow for minor protrusions of bolt heads in the vertical perimeter. Can you please clarify? If the bolt heads on a lift mechanism extend beyond 28" frame perimeter would this fall within R02 and be allowable?

A: ****Edited Feb. 13, 2018**** !R01 and !R02 have exemptions for minor protrusions when determining FRAME PERIMETER and extension beyond the FRAME PERIMETER in STARTING CONFIGURATION. !R03 **also** has *~~no such~~* **those** exemptions *~~and does not reference the FRAME PERIMETER~~*. ****Any ROBOT part (excluding BUMPERS **and* said minor protrusions*)**** outside of the dimensions in !R03 when in STARTING CONFIGURATION is a violation of !R03.

(Asked by **6928** at Feb 2nd 18)

Q272 Frame perimeter and bumper openings

Q: Robot is 30"x23" and on the 30" inch side we want to have a one inch open gap in the bumper. We want a 1" strap with a functional purpose inserted between the 1" bumper opening. The strap in this case is on the outside of the frame and probably isn't legal as it is functional. a) With a 1/4" deep 1" opening in the frame perimeter that contains the strap is that a legal starting configuration? b) The strap is 1/8" thick < than a bolt head in height do we need a 1/8" deep inset in the frame?

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. The Blue Box below !R01 contains a description of how to determine the FRAME PERIMETER. There may be holes or gaps in the actual "robot frame" as shown in the images in Figure 8-2 (the black outline is the FRAME PERIMETER) that don't affect the determination of the FRAME PERIMETER. Make sure that all FRAME PERIMETER corners are protected as required per !R23.

(Asked by **5949** at Feb 2nd 18)

Q273 R33: Clarification of a legal automotive door motor

Q: As a follow-up to Q266, Q102 and Q80, is a COTS automotive power door lock actuator a legal COTS item? The aforementioned questions clarified the legality of a motor and actuator separately, but they did not seem to explicitly indicate the legality of a COTS actuator sold with an integrated legal motor.

A: We cannot rule absolutely on certain items, and the final decision as to legality of a particular ROBOT (and its elements) lies with the Lead ROBOT Inspector (LRI) at each event. If an item is identified by its VENDOR as one of the motors/actuators listed in Table 8-1, it's permitted (and we recommend if it's not obvious, to be prepared to present your Inspector with supporting VENDOR documentation). Legality of an actuator and motor are assessed

independently.

(Asked by **1619** at Feb 2nd 18)

Q274 R33: Clarification of a legal automotive door motor

Q: As a follow-up to Q266 and Q273, is a motor that is an integrated part of a COTS item marketed as a "Power Door Lock Actuator" for automotive doors legal? If so, is the entire COTS item marketed as a "Power Door Lock Actuator" for automotive doors legal, provided the actuator portion is made of legal components/mechanisms?

A: We cannot rule absolutely on hypothetical ROBOT designs or components, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event.

(Asked by **1619** at Feb 3rd 18)

Q275 PCM power control via RoboRIO

Q: Is it allowed to turn off power to the PCM with a SPIKE or another switch?

A: No, this could be a violation of either !R36 or !R62 (depending on implementation) and would not be permitted. We encourage you to post on the [*FIRST* Forums](<https://forums.usfirst.org/forum/general-discussions/first-programs/first-robotics-competition/competition-discussion/control-system>) if you have technical questions, as there may be another, legal, way to accomplish your goal.

(Asked by **5115** at Feb 3rd 18)

Q276 Modified Air Storage Tank

Q: We have an air storage tank that was used in 2014 for our pneumatic system. It was modified by welding brackets onto the tank. It was allowed through inspection in 2014. Would that tank still be legal this year or would it be considered illegal?

A: No, this is a violation of !R82 and would not be permitted.

(Asked by **3036** at Feb 3rd 18)

Q277 Sprocket Guard

Q: Do we have to have a chain and sprocket guard for a chain and sprocket system that is completely enclosed within the robot and is 3 feet between sprockets?

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. There are no rules which specifically require any chain or sprockets to have a guard. The safety of your ROBOT will be assessed by Inspectors at your event (per !R08).

(Asked by **3036** at Feb 3rd 18)

Q278 Is a COTS Air Spring Legal?

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Q: Variations of this question have been asked several times. In Q221 you answered that air springs are not cylinders. Q223 asked if gas springs are legal; you referred to the blue box below R83, which says that gas shocks are legal, but doesn't mention gas springs. In Q260 you said that if a VENDOR defines their COTS air spring as a "linear actuator" it's legal per R83-J. Does a self-contained COTS air spring count as a spring (LEGAL) or a pneumatic component (ILLEGAL)?

A: A self contained COTS air spring is the same as a "closed-loop COTS pneumatic (gas) shocks" and is not considered a pneumatic device.

(Asked by **948** at Feb 3rd 18)

Q279 Bungee in bumper design

Q: We are planning to use reversible bumpers and our bumper design has the bumper going continuously around the corners of the robot. In order to keep the alternate-color flaps secure in the corners, we would like to use bungee cord (no bungee clips/ends). R27-B limits us to "hook-and-loop fastener or snap fasteners backed by the hard parts of the BUMPER".

A: R27 limits markings visible on the BUMPERS when they are installed. If the bungee cord is visible when the BUMPERS are installed, this would violate R27. If the bungee cord is hidden underneath or behind the BUMPER or is covered by fabric, this would not violate R27.

(Asked by **1086** at Feb 5th 18)

Q280 Use Andymark motor am3103

Q: We purchased 2 AndyMark 3103 NeveRest motors through FIRST Choice, but see in the game manual lists the AM-3104 not the AM-3103. The AM-3103 is the same motor as the AM-3104 but has an attached encoder. We hope the AM-3103 is legal to use on our 2018 robot, is it?

A: All AndyMark NeveRest Classic gearmotors (am-2964a, am-2964a_ne, am-3102, am-3102_ne, am-3103, am-3103_ne) use the am-3104 motor and are therefore legal per R33. The NeveRest Orbital gearmotors (am-3461a and am-3637) also use the same motor (though with a different gear and faceplate) and are legal.

(Asked by **6819** at Feb 5th 18)

Q281 Donations of materials from sponsors?

Q: I'm asking for clarification on R13 and is a followup to Q258. If we received a donation in the form of two 20' pieces of aluminum square tubing, does this have to go on the CAW or is it exempted as it is a donation?

A: Any portion of donated material used on the ROBOT must be included on the CAW using its Fair Market Value (see Blue Box example #2 below R13).

(Asked by **2594** at Feb 5th 18)

Q282 distance between mounts for bumpers

Q: Our team is curious about any regulations regarding the distance between mounts that place bumpers on the robot. R32 gives rules regarding the size of gaps that bumpers cover, but it does not seem to give rules on how far

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apart mounts can be.

A: There are no rules that require a min or max distance between hardware used to mount BUMPERS, however please note they must be installed securely.

(Asked by **2993** at Feb 5th 18)

Q283 Can a human player reach into the portal to re position a power cube?

Q: If a human player places a cube in the portal but needs to adjust it before delivering it to the field, are they allowed to reach into the portal to move the cube around or is it similar to last year's rule in that you can't reach into the chute?

A: Rule !S06 prohibits DRIVE TEAM members from extending any body part into the PORTAL chute, with an exception for momentary encroachment. Additionally, !S04 prohibits reaching into the field.

(Asked by **2607** at Feb 5th 18)

Q284 Dimensions bumper material

Q: We are a dutch team and the 3/4 inch (19 mm) plywood for the bumper isn't a standard size wood for us. the standard size is 18 mm thick. are we allowed to use the 18 mm instead of the 19 mm?

A: Per [Section 8.1]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889789) (specifically 3rd paragraph from the end of the section), please email [frcparts@firstinspires.org] (<mailto:frcparts@firstinspires.org>) for team specific inquiries about alternate items.

(Asked by **6920** at Feb 5th 18)

Q285 Does orientation of the cube in the portal matter?

Q: Does the cube have to be placed in the portal with the FIRST logo pointing up/down or can it be placed and distributed on its side? For example: If a robot had a pickup that could only pick cubes up that were on its side (FIRST logo facing parallel to the floor) can the human place the cube in the portal in the way needed or does the FIRST logo need to be perpendicular to the surface it touches?

A: There are no requirements or recommendations regarding the orientation of a POWER CUBE in the PORTAL.

(Asked by **2607** at Feb 5th 18)

Q286 Is a Rotary Speed Limiter Legal?

Q: R8 bans "hydraulic fluids" and "hydraulic items". COTS rotary speed limiters are self contained (not adjustable, not refillable, and require no pumps, tubes, fittings, etc...) and not marketed as "hydraulics", but do use oil as a "force mechanism". Would they be considered illegal?

A: We cannot rule absolutely on specific items, and the final decision as to legality of a particular ROBOT lies with

the Lead ROBOT Inspector (LRI) at each event (in this case, if the item violates !R08). If an item is not identified by the manufacturer/VENDOR as a hydraulic item, then it's not a hydraulic item for the purposes of the *FIRST* Robotics Competition.

(Asked by **5940** at Feb 5th 18)

Q287 G09-A SCALE PLATE not entirely within the NULL TERRITORY

Q: G09-A gives a launching exception when "attempting to place a POWER CUBE on the SCALE PLATE in its ALLIANCE'S NULL TERRITORY". According to the figure 7-2 below this rule (as well as others throughout the game manual), the SCALE PLATE is not entirely contained within the NULL TERRITORY. Will teams be subject to a violation if the otherwise legal launch either attempts to, or does, land a POWER CUBE on the SCALE PLATE beyond the NULL TERRITORY?

A: The PLATE that overlaps the NULL TERRITORY is considered in that NULL TERRITORY. If a ROBOT attempts to launch a POWER CUBE on to that PLATE, but the POWER CUBE lands in spot that is outside the NULL TERRITORY, it was still an attempt on the proper PLATE and not a violation of !G09. Attempting to launch a POWER CUBE to any other PLATE is a violation of !G09.

(Asked by **5881** at Feb 5th 18)

Q288 Gap between BUMPER and FRAME PERIMETER at corners?

Q: Does R32 allow any gap between the BUMPER and the FRAME PERIMETER at corners (e.g. within 1/2" of the end of a BUMPER segment)? Figure 8-8 and a strict reading of R32 seems to imply that no gap is allowed but the answer to 2016's Q304 seems to imply that up to a 1/4" gap is allowed at the corner.

A: Yes, gaps less than the 1/4 in. required per !R31-A are considered backed.

(Asked by **199** at Feb 5th 18)

Q289 Do BUMPERS need to go all the way to the corners?

Q: Is there any tolerance associated with R23's requirement that BUMPERS protect corners. For example, suppose a BUMPER ends 1/16" short of a corner of the FRAME PERIMETER, leaving that 1/16" not covered by bumper. Is that allowed?

A: Please see [Team Update 9]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate09.pdf>). The tolerance is 1/4 in.

(Asked by **199** at Feb 6th 18)

Q290 Score Breakdown

Q: When will the score breakdown for the FRC Events API be released? The development of our scouting system relies on it.

A: Per [the documentation](<https://frc-events2.docs.apiary.io/#reference/match-results/score-details>), the score details will be available at some point during the first three weeks of February (i.e. on or before February 16th).

(Asked by **1678** at Feb 7th 18)

Q291 Score Breakdown

Q: Will points earned from each of the switches and the scale be differentiated in the score breakdown provided by the FRC Events API?

A: Per [the documentation](<https://frcevents2.docs.apiary.io/#reference/match-results/score-details>), the score details will be available at some point during the first three weeks of February (i.e. on or before February 16).

(Asked by **1678** at Feb 7th 18)

Q292 Score Breakdown

Q: Will points for the switches and scale be broken down between auto and tele in the score breakdown provided by the FRC Events API?

A: Per [the documentation](<https://frcevents2.docs.apiary.io/#reference/match-results/score-details>), the score details will be available at some point during the first three weeks of February (i.e. on or before February 16).

(Asked by **1678** at Feb 7th 18)

Q293 TeamForge Website

Q: The TeamForge website run by FIRST at: usfirst.collab.net that allows questions about the FRC Event API Documentation and FRC Event API Feature Requests is unavailable as the license has expired. Will this website be available in the future? If not, where should we direct our questions about the documentation and our feature requests?

A: FIRST is working on re-activating the TeamForge site. Please hold your feature requests and non-emergency questions and enter them once the site is re-activated. If you have an emergency, you can contact [firstroboticscompetition@firstinspires.org](firstroboticscompetition@firstinspires.org).

(Asked by **1678** at Feb 7th 18)

Q294 Closed loop unpressurized pneumatic cylinder.

Q: We are not using a compressed air pneumatic system, but do wish to use a standard pneumatic cylinder in an unpressurized closed loop. Would this fall under R83 (Blue box A&B) or would it be subject to R84?

A: A ROBOT component not used as part of a system containing pressurized air is not considered a pneumatic component and is not subject to the rules in [Section 8.9] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889797). Be prepared to explain and demonstrate to Inspectors that such a device cannot result in contained pressurized air.

(Asked by **4336** at Feb 7th 18)

Q295 Clarification of Rule R32 Bumper Brackets

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Q: Our team is having a hard time interpreting what rule R32 is talking about. Do you have to have brackets within 1/2 inch of the ending of the wood on the bumpers? Also, could you break down for us what the 7"x7" box means in figure 8.8 and what the >1/2" is supposed to represent Thank you

A: !R32 doesn't put requirements/restrictions on BUMPER brackets; instead it's defining how much of a BUMPER can be unsupported from behind (i.e. not backed by FRAME PERIMETER structure). There are no rules that dictate where brackets must be used, but please note that BUMPERS must be securely fastened to the ROBOT per !R30-G. The 7 in. by 7 in. box is showing that, because the amount of BUMPER not backed by the FRAME is only 7 in., and thus below the 8-in. max gap permitted in !R32-B, it's an example of an okay design. The $\geq 1/2$ in. dimension is showing that it's okay for a design to put a gap permitted in !R32-B (that's otherwise within the spec) behind the BUMPER as long as it's 1/2 in. or more from the FRAME PERIMETER corner.

(Asked by **4112** at Feb 6th 18)

Q296 S05/S06 - Length of Brief incursion/Momentary encroachment

Q: S05 allows brief incursions of the ROBOT into the EXCHANGE or PORTAL; S06 allows momentary encroachment of DRIVE TEAM body parts into the EXCHANGE or PORTAL. (1) How many seconds is "brief" or "momentary"? (2) Can a ROBOT's parts enter the EXCHANGE while it is delivering a POWER CUBE, as long as it withdraws from the EXCHANGE within that time? And (3), could a ROBOT and a DRIVE TEAM member have parts momentarily in the EXCHANGE at the same time without incurring a PENALTY?

A: 1. We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. 2. Provided the contact is determined by the REFEREES to be brief per !S05, there are no rules prohibiting this. 3. There are no rules explicitly prohibiting this, provided the ROBOT contact in the EXCHANGE is brief per !S05, and the DRIVE TEAM encroachment in the EXCHANGE tunnel is momentary per !S06. That being said, safety is always our number one priority, and such interaction may be scrutinized and the DRIVE TEAM may be talked to in accordance with the first paragraphs of [Section 5]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503889779).

(Asked by **3407** at Feb 7th 18)

Q297 Are you able to be in contact with the side of the tower during climb

Q: Are you able to be in contact with the side of the tower intentionally during the climb as long as G19 is not violated?

A: Provided !G19 is not violated, there are no rules prohibiting this.

(Asked by **2458** at Feb 6th 18)

Q298 Copyright concerns?

Q: The Submitted Awards page on the FIRST site says that copyrighted music may be used so long as written permission is obtained. However, the 2018 Video Use Consent Form asks us to verify that "the video does not include the copyrighted work or any other person and does not infringe any right of any person or entity." There is nothing in there that would allow for authorized use of copyrighted material. If we were to acknowledge the owner, would we be able to use copyrighted material?

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A: Good catch, thanks! We have updated the [2018 Consent and Release Form] (https://www.firstinspires.org/sites/default/files/uploads/resource_library/frc/game-and-season-info/awards/2018/chairmans/2018-ca-video-consent-use-form.pdf). You are allowed to use copyrighted material if you have the written authorization to do so. However, just acknowledging the owner does not grant authorization.

(Asked by **195** at Feb 7th 18)

Q299 Scale Height Including Scale Wall

Q: Given that the scale platform is 6 feet tall at it's highest point. How high is the upper edge of the scale including the scale wall?

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. Any measurements or materials information can be derived from the Field Drawings available at: (<http://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>) (<http://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>)

(Asked by **6883** at Feb 6th 18)

Q302 Is this solenoid legal?

Q: So my team has a question about solenoids and whether or not this specific one we found on amazon is legal. <https://www.amazon.com/Baomain-Solenoid-4V210-08-Position-Fittings/dp/B01K6L613M> Here is the link and if we were to use this on our robot would it be legal?

A: We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs, or questions that are overly broad, vague, and/or include no rule references. Please consult [Section 1.8] (https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

(Asked by **4500** at Feb 7th 18)

Q303 Clarification on Question 283

Q: What qualifies as momentary encroachment in regards to the portal? Is momentary encroachment meant to mean when a human player places the cube into the portal?

A: We believe the first part of your question has already been asked, please refer to !Q296. For the second part of your question, "encroachment" refers to any part of the human being extending in to the RETURN chute, the PORTAL chute, or the EXCHANGE tunnel regardless of if there's a POWER CUBE or not. It does not apply to a POWER CUBE.

(Asked by **2607** at Feb 8th 18)

Q304 Clarification on G22

Q: If in the process of picking up a power cube, this action causes more power cubes to hit the robot but do not get caught inside the robot, would this fall under the category of deflecting and therefore not be a violation of G22? For example: picking up a cube at the bottom of a stack which causes the ones on top to fall on the robot.

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A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Per the Blue Box below G22, "being hit by a POWER CUBE that bounces into or off of a ROBOT" is considered "deflecting" and is not considered "control" of the POWER CUBE.

(Asked by **2607** at Feb 7th 18)

Q305 Rule 39, What qualifies as a COTS computing device?

Q: Will a small LED RGB strip with a built in program/color selector qualify as a COTS computing device? If so, would the included COTS Battery pack containing 3 AA batteries also comply with R39 allowing for a separate power source for said COTS computing device? For reference one similar to the one located at the link below. https://www.amazon.com/gp/product/B076MPXVZN/ref=ox_sc_act_title_2?smid=AM2CN175ORHCA&psc=1

A: We cannot rule absolutely on hypothetical parts or ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Generally, a device which contains a processor or similar device (e.g. SoC, microcontroller, etc.) is a "computing device", and these devices, if COTS, may be powered by battery packs as detailed in !R39

(Asked by **364** at Feb 8th 18)

Q306 Conflicting answers regarding backing bumpers at corners?

Q: Our understanding of the answer to Q288 is that R32-A (mistyped as R31-A?) allows a 1/4" gap between the bumper and the frame perimeter within 1/2" of the end of a bumper. But the answer to Q295 says "The $\geq 1/2$ in. dimension [in Fig 8-8] is showing that it's okay for a design to put a gap permitted in R32-B (that's otherwise within the spec) behind the BUMPER as long as it's 1/2 in. or more from the FRAME PERIMETER corner." Is the $\geq 1/2$ " for R32-B but not R32-A, despite its location in Fig 8-8?

A: Sorry for the confusion. [Team Update 10]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate10.pdf>) revises the image and !R32 to clarify the intent. 1/4" gaps allowed per !R32-A are allowed anywhere along the BUMPER. Larger gaps allowed per !R32-B must be further than 1/2" from the end of the BUMPER segment.

(Asked by **199** at Feb 10th 18)

Q308 Victor SPX Cost Accounting

Q: The Victor SPX was introduced this season as a new and legal motor controller but unlike all the other motor controllers, it has not been included in the KOP, FIRST Choice, or been made available via a donated voucher. Does this imply that the Victor SPX should be included in the Cost Accounting Worksheet?

A: Yes. As you've noted, the Victor SPX does not meet the definition of a KOP item and would therefore need to be listed on the CAW.

(Asked by **900** at Feb 10th 18)

Q309 Custom POE Cable

Q: We would like to make a custom POE cable for our Radio. To minimize potential failure, we would like to use the standard color coded wires in the Ethernet cable to bring power from the VRM directly to the radio. Thus Pins 4&5 on the Blue/Blue White pair directly to the 12V/2A Red + port on the VRM and Pins 7&8 on the Brown/Brown White Pair directly to the 12V2A Black – port on the VRM. I believe this configuration was approved last year on QA #242 but I cannot locate that post.

A: Yes, please see [Team Update 11]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate11.pdf>).

(Asked by **2883** at Feb 13th 18)

Q310 Vertical Distance between frame pieces and Rule 32, Figure 8.8, structural elements

Q: (A) When measuring distances for rule 32(B), are only horizontal distances measured, or are vertical distances also included? For example. do two adjacent pieces of frame 8" apart horizontally and 3" apart vertically violate 32(B)? <http://bit.ly/2EvwWfZ> is an illustration, but asking about the general rule. (B) When determining whether a piece is "structural" for the purpose of the definition of "Frame Perimeter," is it sufficient that the piece is intended to support a bumper?

A: A) The measurement should be made horizontally along the FRAME PERIMETER, not diagonally between the structural elements. B) The FRAME PERIMETER does not necessarily need to serve a structural purpose beyond supporting the BUMPERS.

(Asked by **5607** at Feb 11th 18)

Q311 Copper Signal Wires

Q: R59 states that all signal wire must be copper, with exemptions. Does the exemption include a.) unmodified COTS Ethernet cable, b.) unmodified COTS PWM cabling, c.) Purchased COTS Ethernet or PWM cables that are modified for length.

A: Please see [Team Update 11]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate11.pdf>). Non-copper wiring may be used for SIGNAL LEVEL circuits only.

(Asked by **1885** at Feb 13th 18)

Q312 Use of a solenoid valve with 1/4" NPT Ports if using reducers

Q: We have solenoid with 1/4" NPT ports, Can we install 1/4" to 1/8" brass reducers to be fully compliant?

A: No. !R83-D requires the ports on the solenoid valve itself to be 1/8"

(Asked by **23** at Feb 12th 18)

Q313 Follow up to Q276: Modifying the tank brackets

Q: I misunderstood the history of the air storage tank I asked about before. It turns out the brackets were already on

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the tank when it was purchased. We just made the holes on the brackets wider. Would this be a violation of R82?

A: If the brackets are a permanently attached (welded, glued, molded in, etc) part of the tank, they may not be modified per !R82. If the brackets are designed by the manufacturer to be separable, they are not considered part of the pneumatic device and may be modified.

(Asked by **3036** at Feb 12th 18)

Q315 Air storage tank ports

Q: If you have a tank with a port that is bigger than 1/8 inch npt fitting and there is an adapter for 1/8 npt fitting would this be legal to use with an adapter?

A: There are no requirements for port sizes on pneumatic storage tanks, and no rules against using adapters on those tanks, so yes, this would be legal.

(Asked by **3036** at Feb 12th 18)

Q316 R32 "Bumper Wood Segment" clarification

Q: In R32, it defines that "to be considered supported, a minimum of 1/2" at each end of each BUMPER wood segment must be backed by the FRAME Perimeter. We would like a clarification of what is considered a "wood segment". If we have [(or U) shaped bumpers, would that be made of 3 different "wood segments" or would the whole bumper count as 1 segment?

A: A "wood segment" doesn't necessarily correlate to the length of a FRAME PERIMETER side or BUMPER assembly; instead, it's defined by the team's design and assembly choices. For example, a 20 in. FRAME PERIMETER side may be protected by a BUMPER assembly that includes two (2) 10-in. pieces of wood (or "wood segments"). Each end of those 10-in. pieces must meet requirements defined in !R32.

(Asked by **2410** at Feb 12th 18)

Q317 Carbon Fiber

Q: Regarding frame perimeter materials, can our team use carbon fiber?

A: There are no rules against this. And, cool, if you can make it work.

(Asked by **3397** at Feb 12th 18)

Q318 Using a power cube

Q: In Q82, the answer states "a pre-loaded POWER CUBE must be "fully and only supported by the ROBOT"; there is no requirement that it be contained within the FRAME PERIMETER." Related to this: since a robot can start pre-loaded with a power cube, can the power cube be used as leverage to ensure a robot mechanism is contained within its starting configuration (i.e the loaded cube pushes against the mechanism to ensure it is contained within its frame perimeter)?

A: There are no rules against this.

(Asked by **4069** at Feb 12th 18)

Q319 What is considered "fixed" (In terms of the FRAME PERIMETER)

Q: In rule 8.2 R01, it is stated that the robot's bumper zone is comprised of "fixed, non-articulated structural elements". Does a small carbon fiber board installed and held in place with 2 screws and a zip tie to protect an edge of the frame count as fixed? It doesn't really wobble (only slight vibrations) Also, what does articulated mean? Thanks

A: We cannot rule absolutely on ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Generally, there aren't FRC specific definitions of fixed and articulated. Other ways to describe this concept in this context include "static," "rigid," and "securely fastened."

(Asked by **5737** at Feb 12th 18)

Q320 Throwing, Launching, Dropping, G22/G09

Q: G22 & G09 cover "launching", "throwing in a forceful way", etc. One could say applying any force is "forceful" and that an action that releases a cube from a robot in such a way that the only forces imparted aren't external to the robot would violate G09. This would preclude any mechanism that relies on lateral motion of the POWER CUBE to intake/exhaust. Lack of substantive clarification leaves this open to a wide range of HR interpretations & is detrimental to teams. Please clarify these terms.

A: Please see !Q148. There is no _FIRST_ Robotics Competition specific definition of forceful.

(Asked by **5881** at Feb 12th 18)

Q321 Are crimped ferrules allowed to be used with 12ga wire for 40A circuits?

Q: May teams use crimp-on ferrules (such as Wago 216-207) on 12AWG wire for insertion into the PDP for circuits that are protected by a 40A breaker?

A: Yes, there are no rules that prohibit this.

(Asked by **2449** at Feb 12th 18)

Q322 Off Board Compressor

Q: Can we bring a compressor to use only in the pit for testing purposes as we don't want to waste battery power separate from the one on our robot? Or is it illegal to have a separate compressor to use just in the pit and not on the field.

A: It depends. Please see !R85 as updated in [Team Update 12] (<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate12.pdf>). If that doesn't answer your question, please rephrase and resubmit.

(Asked by **23** at Feb 17th 18)

Q323 Would silicon lubricants be legal in the pits and on a robot?

Q: Most silicon lubricants are flammable. Knowing that would this make silicon lubricants illegal in the pits as well as on the robot?

A: There's no overt prohibition of silicon lubricants, but we cannot present a "yes" or "no." If the LRI or Event Staff decide a part of substance is likely to cause a hazard or is being used in a hazardous way, they may require it be removed from the event. Additionally, consider !R10 when deciding where and how lubricant will be used on the ROBOT.

(Asked by **3036** at Feb 13th 18)

Q324 Climbing - direct contact clarification

Q: Per the definition of climbing in the rules glossary, is a robot considered to be in direct contact with the platform if it has climbed up on an unattached ramp (supported by the platform) that has been deployed by either itself or by another robot?

A: Any part of the ROBOT that is physically contacting the PLATFORM is considered in direct contact. You may want to consider !G06 in reference to the "unattached ramp".

(Asked by **3711** at Feb 13th 18)

Q325 Practice Matches

Q: Do practice matches have to be reserved prior to the competition or are they to be scheduled at the event? We would like to practice with our robot at the actual event at WPI on March first through the third, but wanted to know if we have to RSV before or can just get in on the first for a practice match. Any help would be much appreciated.

A: Per Section 10.2, "The Practice MATCH schedule is available as soon as possible, but no later than the start of Practice MATCHES. It will also be published and available online at the [FIRST Robotics Event Results site] (<https://frc-events.firstinspires.org/>)". At most events, this is published either the night before practice matches start, or the morning of practice matches. There is no way to "reserve" practice matches, they are randomly assigned. Note also that "Practice MATCHES are not guaranteed at District Events due to event schedule constraints." You should ask the _FIRST_ Technical Advisor at your event, after you check in, for more information.

(Asked by **23** at Feb 13th 18)

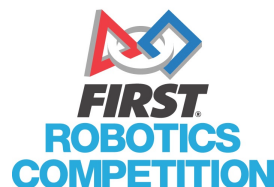
Q326 Lubricants and Power Cubes

Q: Can non-flammable lubricants be used on robot parts that interact with the power cubes?

A: No. Per !R10, "Lubricants must not contaminate the ARCADE". The definition of ARCADE includes the POWER CUBES.

(Asked by **3359** at Feb 14th 18)

Q327 Bumper material Attaching to the bottom of the robot



Q: We were wondering if it is legal to attach the flap of our bumper fabric to the bottom of the robot frame, so we do not have fabric flapping around, or getting caught on the carpet. We have reversible bumpers, for easy switching between matches. The bottom of our 4 1/2 inch bumpers are flush with the bottom of our 2 inch robot frame. That leaves about 2 1/2 inches of one color displayed inward to the robot, and to remedy that, we made the flap longer to cover that bit too.

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Generally, there are no rules that prohibit securing BUMPER fabric to the ROBOT frame.

(Asked by **6574** at Feb 14th 18)

Q328 Can other devices besides the human player's body enter the portal?

Q: While Rule 06 prohibits DRIVE TEAM members from extending any body part into the PORTAL chute, with an exception for momentary encroachment, there is nothing that states whether a device that meets the requirements under H07 may be used to interact with a cube in the portal. For example, a non-powered signaling device is used by the HP to dislodge a stuck cube so it may be delivered to the field. Is a device like a non-powered signaling device allowed to interact with the portal chute?

A: No. If the item is used to manipulate a POWER CUBE, it is not meeting the required condition described in !H07 vii.

(Asked by **2607** at Feb 14th 18)

Q329 Team Update 11 and R03 Clarification

Q: The most recent team update reworked R03 to allow for minor frame protrusions. How is the frame perimeter going to be measured at event inspection? We were under the assumption there would be a sizing box the robot would need to be in after talking to a few robot inspectors. Will this change now that minor frame protrusions are allowed?

A: There is no single prescribed procedure for measuring ROBOTS during Inspection.

(Asked by **303** at Feb 15th 18)

Q330 Chassis Material Requirements

Q: Hello. We have a question regarding the material requirement for the frame of the robot. Does it need to be completely made only out of metal? Or can it also incorporate other materials like plates of carbon fiber?

A: There are no requirements dictating that the frame of the ROBOT be made of metal.

(Asked by **5737** at Feb 14th 18)

Q331 Starting Alignment

Q: Hello. Can a robot starting the autonomous program began sideways with bumpers touching the alliance

station? Or does it always have to start with it pointing forwards?

A: ROBOT starting position is governed by !G01 (and other rules referenced from !G01 or that govern terms used in !G01 such as STARTING CONFIGURATION) and contains no requirements that the ROBOT be pointing "forwards".

(Asked by **5737** at Feb 14th 18)

Q332 How do we wire an additional Pneumatic Control Module

Q: So we need to add an additional Pneumatic Control Module to our robot to power 4 more solenoids. How would we provide power to the 2nd Pneumatic Control Module, would we split the power going to the first PCM or would we run it through a Power Distribution Board port as if it was another motor controller under a 20 AMP breaker?

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. For technical assistance, please visit the [FIRST Forums](<http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition>).

(Asked by **4500** at Feb 14th 18)

Q333 G05 G13 Fallen Robot Grace Period

Q: Does the fallen robot grace period G13 also apply to violations of G05? If a robot tips over and extends beyond the 16", will it be automatically assessed the foul. If the robot attempts to right itself using the scoring arm or an auxiliary designed specifically for righting during the grace period, will it still be assessed the foul if it extends past the 16"? Would such an operation simply be deemed too dangerous and require the robot to be disabled?

A: The grace period in !G13 only relates to contact from opposing ROBOTS, it does not affect any other rule. A ROBOT which extends beyond the 16 inch limit prior to the ENDGAME, for any reason, is a violation of !G05 and will be assessed a FOUL. A MECHANISM which goes beyond the extension limit in order to tip a ROBOT upright may be deemed a strategic violation and assessed a RED CARD (with the final determination made by the HEAD REFEREE). Note that the extension limit is relative to the FRAME PERIMETER (as shown in the second and third images in the !G05 Blue Box), meaning that a ROBOT over 16 inches tall does not automatically violate !G05 by tipping over.

(Asked by **687** at Feb 16th 18)

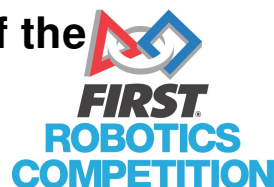
Q334 Motor removed from 2012 Kit of Parts Fisher-Price gearbox

Q: Can we use 00968-9013 motors, removed from the Fisher-Price 00968-2821 gearbox from the 2012 K.O.P.?

A: No, please see !R33.

(Asked by **4325** at Feb 17th 18)

Q335 Must the Pneumatics gauges be visible on one plane of the Robot?



Q: Our team wants all gauges to be visible from the Robot. Are there any restrictions that state that we must place all gauges in a particular format in which all gauges are visible on one plane at any time?

A: !R90 only requires that the gauges be easily visible, not that they both be visible from the same location.

(Asked by **4123** at Feb 17th 18)

Q336 24V limit with R51 and CUSTOM CIRCUITS

Q: With respect to R51, what is the definition of 'CUSTOM CIRCUITS shall not produce voltages exceeding 24V'? Is this a restriction on internal voltages used in the CUSTOM CIRCUIT, or only an output restriction? If it is an internal limit as well, are teams required to provide documentation stating any COTS CUSTOM CIRCUIT does not produce internal voltages greater than 24v? While powering a CUSTOM CIRCUIT on, is a voltage transient in excess of 24V be allowed? Is 24v limit nominal?

A: CUSTOM CIRCUITS designed to produce voltage (i.e. 'boost' power supplies) will be evaluated for the designed operating voltage (the 24V limit is nominal). Transients during power up initialization are considered normal and will not be tested during inspections. Inspectors will not require documentation that all COTS devices meet this requirement, unless there is reason to suspect that a device exceeds the restriction (i.e. CCL light tubes, 120V power line inverters as part of a circuit, etc.).

(Asked by **41** at Feb 22nd 18)

Q337 Multiple robot configurations and inspection

Q: Can a robot be brought into the event bagged at 150lbs knowing that the final robot configuration needs to be 120 lbs at the time of inspection? If so, can a robot be inspected in 2 separate configurations that are independently legal? Would switching between these configurations require a new inspection each time?

A: 1) Absolutely. 2/3) If, collectively, the configurations meet all ROBOT rules, then yes a ROBOT can be inspected in two configurations and switch between them. For example, if a team has two arm assemblies that, along with the rest of the ROBOT don't violate any ROBOT rules when presented together - but the team only intends to use one arm assembly at a time, per !I03 they may all be presented at Inspection and per !I04-F, they can switch between A and B between matches. If the configurations do not meet all ROBOT rules collectively (e.g. combined weight is greater than 120 lbs.), then both configurations cannot be inspected simultaneously and re-inspection would be required when switching between them.

(Asked by **2544** at Feb 20th 18)

Q338 Is the technician able to pre-charge the pneumatic system in queue prior to match start?

Q: Is the technician able to pre-charge the pneumatic system in queue prior to match start or does this have to be done in the pit?

A: There are no rules that prohibit this, but please pay special attention to !S01.

(Asked by **102** at Feb 19th 18)

Q339 What is the hight, from the floor to the Power Up Buttons on the Vault?

Q: Could you please tell us what the hight is, from the floor to the buttons, on the Vault? 3.6.3 does not address this and we have a little person on our drive team who will have to be prepared to press this button. Thanks for your time.

A: Specific dimensions can be found in/derived from the official drawings, specifically, VAULT components and assembly are in the [Field Drawings - *FIRST* POWER UP specific] (<https://firstfrc.blob.core.windows.net/frc2018/Drawings/FieldDrawings-FIRSTPOWERUPspecific.pdf>) package. Dimensions not explicitly called out in the documentation can also be found using the official CAD models (link is in the "Playing Field Details" section of the [Game and Season webpage](<https://www.firstinspires.org/resource-library/frc/competition-manual-qa-system>)). Please see !H07-D in regards to special equipment required to aid with a disability if one is present.

(Asked by **1792** at Feb 19th 18)

Q340 Bumper Materials

Q: R30 does not appear to prohibit the addition of metal to a bumper, as long as the wood backing the bumper is 3/4 in thick and pool noodles are correctly installed and covered. Would a team be allowed to add a metal piece on the bumpers to increase weight as long as the bumpers still comply with R29, or is this prohibited?

A: No. !R30 restricts BUMPER material to what's listed in parts A through G.

(Asked by **3648** at Feb 19th 18)

Q341 Do bumpers have to be parallel?

Q: Do bumpers have to be parallel? Can bumpers on one side of our robot be an inch lower than on other sides? In considering this question, the bumpers will be within the 0 to 7.5 inch bumper range.

A: BUMPERS do not have to be parallel to the floor (please see !R24). They also don't have to be parallel to each other (impossible for a three sided ROBOT). They don't have to all be mounted at the same height, provided, as you note, that they're within the BUMPER ZONE. They do have to be mounted such that the wood backing is vertical.

(Asked by **5724** at Feb 19th 18)

Q343 CAW for recycled materials donated to team

Q: Our school was throwing away two projector screen frames, but we recyceled them to use on our robot. The frames are made up of 1" aluminum square tubing and plastic 90 degree corner brackets that insert into the ends of the square tubing. How should we account for this material on our CAW? Since 1" square tubing was included in the KOP, can we exclude the recycled tubing from our CAW, even though it isn't exactly the same? What about the corner brackets?

A: Savvy and resourceful! !R13 requires you to include on your CAW the fair market value of the recycled materials. You should be able to find some reasonable comparable product to price out in the open market, and that is the

pricing to use on the CAW. Be ready to explain your pricing to the Inspectors. No, aluminum that isn't equivalent to a KOP item (size, alloy, etc.) can not be accounted for as if it were a KOP item.

(Asked by **6802** at Feb 19th 18)

Q344 Points for Cubes in Vault after Power Up has been activated

Q: If we play a level 1 Boost early in the match do we still get the 5 cube points for additional cubes placed in the Boost Vault after the Power Up was played?

A: Yes. Please see the last paragraph and blue box in [Section 4.3]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc506566488).

(Asked by **3230** at Feb 19th 18)

Q345 FMS Reported Plate Colors

Q: Section 10.8 - ARCADE FAULT is defined as an error in ARCADE operation that includes, but is not limited to: certain broken FIELD elements, power failure to a portion of the FIELD, improper activation by the FMS, or errors by FIELD staff. Section 3.10 - FMS provides the ALLIANCE color assigned to each PLATE, immediately following the assignment of PLATE color prior to the start of AUTO. Would the data not being returned immediately and/or incorrectly be considered an ARCADE FAULT?

A: While we're not sure what you mean by "immediately," yes, any time the FIELD doesn't behave properly, it's considered an ARCADE FAULT. Please note that a replay is only done if the ARCADE FAULT affected the outcome of that MATCH in the judgement of the HEAD REFEREE per [Section 10.8]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc506566528).

(Asked by **1747** at Feb 19th 18)

Q346 Scale Scoring During Autonomous

Q: Can teams score using the scale during the autonomous period? If so, is there an accepted way to program that without altering the FMS?

A: Yes, teams can score on the SCALE during the Autonomous period. The Field Management System (FMS) is already programmed to accommodate teams scoring during the Autonomous period. See [Section 4.2]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc506566487) in the Manual, especially Table 4-1, to see the MATCH points available during that time.

(Asked by **3359** at Feb 19th 18)

Q347 H02 - Wireless Device Clarification

Q: By H02, DRIVE TEAMS may not use devices that have the "capability" to receive communications from persons outside the ARCADE. Most laptops used as part of the OPERATOR CONSOLE have wireless cards with the capability to receive communications from persons outside the ARCADE. Are laptops with wireless cards not allowed for use by the DRIVE TEAM during the match?

A: Laptops with their wireless devices shut off are not capable of receiving wireless communications, so these

devices would not violate !H02.

(Asked by **900** at Feb 19th 18)

Q348 Does surgical tubing count as a minor protrusion?

Q: Rule R03 states that minor protrusions less than 1/4" are allowed outside of the frame perimeter. Would a piece of surgical tubing less than 1/4" used as a fastener be considered a minor protrusion?

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to the legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. However, there is no requirement that the minor protrusion be made of metal, or have a specific purpose.

(Asked by **694** at Feb 19th 18)

Q349 Operator Console Controllers

Q: According to rule R101 "no other form of wireless communications shall be used to communicate to, from, or within the OPERATOR CONSOLE."; We are currently using two wired Logitech F310 gamepads to control our robot. Would the use of two wireless Logitech F710 gamepads, that does not use a Wi-Fi adapter to communicate but a proprietary RF dongle and seem to have the same functionality/button mapping as the Logitech F310 gamepads, be a violation of rule R101?

A: Yes, the use of wireless gamepads to communicate with the OPERATOR CONSOLE would be a violation of !R101.

(Asked by **59** at Feb 19th 18)

Q350 Can a Driver Station Include Height Adjusters

Q: Can a shorter driver use devices such as a step stool to increase visibility during competition?

A: Per !H07, items like step stools for shorter drivers are only allowed if they are required due to a disability. If a driver brings a step stool, you can expect a Referee to ask if it is required because of a disability.

(Asked by **6883** at Feb 19th 18)

Q351 Safety Captain Eligibility

Q: Are there any requirements for a team member to be safety captain? We've seen mentions to "student safety captain" in the safety manual and the requirement for the presence of a student during the robot inspection at events. Can the team have a nonstudent pre-college member as safety captain together with a student team member during the inspection? If not, can the safety captain be swapped throughout an event?

A: There are no required criteria for a team's selection of their safety captain, nor is there a requirement that it stay the same person throughout the event.

(Asked by **383** at Feb 21st 18)

Q352 Follow up to 142: Pressure regulator to control solenoid exhaust.

Q: Would it be legal to use pressure regulators to control the speed of the solenoids exhaust? We would mount them directly to the exhaust ports of the solenoid valve.

A: There are no rules prohibiting this.

(Asked by **3036** at Feb 20th 18)

Q353 Power Cubes

Q: If there are other accessible Power Cubes on the field, is it a violation of rule G12 to have two robots block both opponent portals?

A: Yes, please see [Team Update 14]

(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate14.pdf>).

(Asked by **1678** at Feb 23rd 18)

Q354 Can a robot extend its manipulator past the Exchange Zone opening?

Q: Can robots can extend their manipulator inside the exchange zone when initially launching a Power Cube into the Exchange Zone opening? For an example, once we drive up into the Exchange Zone and we use our manipulator to push the cube into the opening, can our robot's manipulator be extended into the opening or end in the opening after the launch of the Power Cube? Our robot does not extend past the 16" rule limit.

A: IS05 prohibits *contact* with anything outside the FIELD (with exceptions for brief instances). There are no rules that prohibit reaching beyond the FIELD borders, however if a ROBOT reaches in such a way that IS01 is violated, they'll be DISABLED.

(Asked by **2550** at Feb 21st 18)

Q355 Is NVIDIA Jetson TX2 a legal part?

Q: Our team bought 2 of the Nvidia Jetson TX2 developer kits. Nvidia is a FIRST supplier who supplies the TX1 via FIRST Choice. This purchase was \$600 for 2 of the Nvidia Jetson TX2 developer kits or \$300 per kit. However, the advertised price on their website is \$560 for a single developer kit. The TX2 module is \$499 and the rest of the developer kit could be purchased separately via other suppliers. Since we paid \$300 per developer kit, are we within rules?(See Section 8.4 Rule 13 Example 3)

A: If the reduced price is available to all FRC teams, the part may be accounted at that price on the CAW and therefore would comply with !R12. If that price is only available to a subset of teams, the part must be listed at the Fair Market Value (FMV) and would therefore exceed the \$500 limit per !R12.

(Asked by **5181** at Feb 21st 18)

Q356 Two double solenoids connected to one cylinder

Q: Can one side of one double solenoid be connected to a cylinder and one side of another double solenoid be connected to the opposite port of the same cylinder?

A: There are no rules that explicitly prohibiting this.

(Asked by **2522** at Feb 21st 18)

Q358 Reflective Tape on robot

Q: Can we place small pieces of reflective tape on the robot for visual tracking by the drive team?

A: There are no rules that expressly prohibit this. However, depending on its implementation, it could violate !R08 (see Blue Box, part C), and the DRIVE TEAM should be aware of !H07.

(Asked by **4056** at Feb 22nd 18)

Q359 Would touching the fence be considered breaking the vertical plane?

Q: G09 B states that a robot is allowed to launch cubes when its bumpers are touching the fence or if any part of the robot is intersecting the vertical planes defined by the switch fence. Would a robot touching the fence intersect the vertical planes of the switch fence?

A: A ROBOT only touching the outside face of the FENCE (i.e. the vertical face of the polycarbonate panel) has *reached* the plane, but is not *intersecting* it. A ROBOT that is touching the top of the FENCE is intersecting the vertical plane.

(Asked by **694** at Feb 22nd 18)

Q360 Dual power supply to radio

Q: Are we allowed to use both the POE cable and the barrel jack cable to provide power to the radio at the same time. The rules appear to state that only one is allowed at a time but we have read and been told that both can be used simultaneously. We asked a local inspector and he suggested getting an official answer. Thank you.

A: As long as power to both wires is provided by the 12V 2A terminals of a single VRM, this would comply with !R53.

(Asked by **3676** at Feb 24th 18)

Q361 Is steel angle included in R30 part E?

Q: R30 part E allows aluminum angle to be used to clamp bumper fabric, along with a vague listing of "other fasteners", with examples given of staples and screws. Would steel angle, used solely to clamp the bumper fabric to the wood backing, be considered an "other fastener" for the purposes of R30 part E and be legal?

A: No, angle is not a fastener.

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(Asked by **2177** at Feb 28th 18)

Q363 NeveRest motor wiring

Q: R36 states that up to 2 NeveRest Motors can be controlled by a single motor controller. If we use two of these motors on our intake mechanism is it acceptable to wire these two motors together (reversing the polarity of one, since it will be on the opposite side of the intake) leaving only 2 wires to run back to the motor controller? Also, since these motors come with 18awg wire attached to the motor, is it acceptable to use 18awg wire going back to the motor controller in the above case?

A: Yes. Yes, provided that a 20A or smaller breaker is used to protect the circuit per !R59.

(Asked by **6802** at Feb 26th 18)

Q364 Accidental Dropping of Cube vs. Tactical Placement

Q: Hi, our group would like a clarification between tactical block placement and accidental placement. What happens if our robot doesn't have a mechanism to pick up a block that has fallen off from a portal? Is the robot allowed to ignore the block and continue with another attempt to try and get a cube from the portal or does the failure counts as controlling the cube?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Generally, a POWER CUBE on the floor being pushed away from a PORTAL in the process of accessing the PORTAL would be an example of "bulldozing" and not considered control per !G22.

(Asked by **5737** at Feb 24th 18)

Q365 Q23 and G05 conflict clarification on Robot Height/Extension more than 55in

Q: The answer to Q23 states "After the MATCH has started, there are no rules limiting ROBOT height," however in G05 (which is referenced in the answer to Q23) it clearly says "ROBOTS may not extend more than 16 in (41 cm). beyond their FRAME PERIMETER." After watching the Week 0 matches and seeing how tall the robots appear, is the ROBOT HEIGHT unlimited once the MATCH has started?

A: The answer to !Q23 is correct. The 16 in. extension rule restricts reaching horizontally beyond the FRAME PERIMETER, not vertically (provided that vertical extension doesn't also reach "out" past the 16 in. limit).

(Asked by **3617** at Feb 26th 18)

Q366 G09 and R4 clarification on legal distance from fence when launching

Q: Our robot projects cubes from a shooter that does not extend outside of our bumpers. We are confused about how far from the switch fence we are allowed to be. If we add a "stick" that projects outward 16 inches from the bumper (legal per R04) but has no other purpose, does this legally allow us to shoot from 16 inches away? We want to know now rather than at competition and we not looking to violate the spirit of rules. We are looking for

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clarification not loopholes.

A: ****Updated 2/27/18**** Thank you for thinking proactively. ROBOTS may "launch" if ~~they're~~ *their BUMPER is* in contact with the SWITCH FENCE *or* *any part of the ROBOT is* intersecting the vertical planes defined by the SWITCH FENCE (i.e. reaching over it). If you want to launch, but don't want to meet the first criteria, then you'll have to find a way to meet the 2nd criteria (or vice versa).

(Asked by **178** at Feb 26th 18)

Q367 Launching Cubes across the switch

Q: Can you launch a cube while in contact with the switch fence across the entire length of the switch to the other side of the switch?

A: No, please see !G09 and its accompanying Figure 7-2.

(Asked by **6424** at Feb 26th 18)

Q368 Unintentional Dropping of Cube

Q: Hello, our team would like to ask if an unintended accident occurred whilst a ROBOT is controlling a POWER CUBE and the POWER CUBE fell out of the mechanism that carries the POWER CUBE. Would an attempt to control another POWER CUBE violate rule G22? Or would it be okay to attempt to pick up and control another power cube while leaving the previous one aside.

A: There is no rule requiring a ROBOT to continue to interact with a particular POWER CUBE after controlling it. If a ROBOT drops a POWER CUBE, they're free to move on to another, or attempt to regain control of the one they dropped. That being said, we cannot comment absolutely on all hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. For example, per the Blue Box in !G22, "If a POWER CUBE becomes lodged in or on a ROBOT, it will be considered controlled by the ROBOT. It is important to design your ROBOT so that it is impossible to inadvertently or unintentionally control more than the allowed maximum."

(Asked by **5737** at Feb 26th 18)

Q369 Assembling bagged robot for demonstrations

Q: Our team had to bag our robot into 2 bags because of its height and we have to fly from our home on Beaver Island, to the mainland in order to transport. The question is whether it can be taken out of the 2 bags for reassembly in order to demonstrate to the community before our first scheduled event later in March?

A: Provided it's only "reassembly" and not "work on" the robot that evolves it into something beyond what it was pre-bag, you're good, per !R19-G

(Asked by **6098** at Feb 26th 18)

Q370 Power cube loading into scale

Q: If we are loading a power cube into the scale, and one or more power cubes are already loaded. If we accidentally or deliberately push one of these power cubes to make space to place ours mean that we are

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controlling more than one power up at a time.

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. "Nudging," as described by part H of the Blue Box with !G22 is not considered "control."

(Asked by **5420** at Feb 27th 18)

Q371 Can we unlock ROBOT for packaging reason?

Q: We are international team and we are just packing our ROBOTS for a regional event. For the packing, the broker asked us the following requests. Is it possible for us to unlock robot bag for packing? First, we have to make our ROBOT compact for packing and add air-cushion inside the robot bag. Second, we have to put marking stamp to the ROBOT for dealing with custom. When we unlock ROBOT, what reason should we write on the explanation field of robot lock-up form?

A: For special circumstances surrounding ROBOT transportation, please contact us at firstroboticscompetition@firstinspires.org (mailto:firstroboticscompetition@firstinspires.org)

(Asked by **6909** at Feb 26th 18)

Q372 Air Tank Mounting and R08

Q: The 2017 FIRST Pneumatics Manual includes a picture of an air tank mounted with zip ties, is mounting air tanks with zip ties sufficient to satisfy R08? If not, what is the test for determining whether an air tank mounting design causes an unsafe condition per R08?

A: We cannot rule absolutely on hypothetical ROBOT designs or assemblies, and the final decision as to legality lies with the Lead ROBOT Inspector (LRI) at each event. Generally, tanks mounted in a way or location such that they're likely to rupture or become dislodged will prevent a passed inspection.

(Asked by **401** at Feb 27th 18)

Q373 Are there color requirements/restrictions on the back of the bumper?

Q: My questions relate to the face of the bumper wood that backs against the robot frame (left side of the wood in Figure 8-6). A) Is this face of the wood considered "exterior", and thus subject to R30 D ("The cloth must completely enclose all exterior surfaces of the wood...")? B) Are there any rules prohibiting displaying non-alliance color on this face (e.g. red material is visible on this face when a blue bumper cover is in use during a match)?

A: A) Nope, not exterior. B) There are no rules that dictate what color can/can't be on the "back side" of the BUMPER.

(Asked by **4534** at Feb 27th 18)

Q374 Unintentional Herding During Auton

Q: During the autonomous period, when a ROBOT goes around the SWITCH through the PLATFORM ZONE, is it

breaking G22 by HERDING a cube if the ROBOT unintentionally catches a POWER CUBE and moves it because of the narrow margin of space the ROBOT must move between the SCALE PLATE and the line of POWER CUBES next to the SWITCH, or would this be considered BULLDOZING, as it is not intentionally being moved across the FIELD by the ROBOT to a desired spot?

A: !G22 makes no distinction between control in AUTO versus control in TELEOP. If, in the judgement of the REFEREES the ROBOT was "intentionally pushing a POWER CUBE to a desired location or direction" (or, more generally, "controlling"), it is in violation of !G22.

(Asked by **4376** at Feb 28th 18)

Q375 Clarification of answer to Q366

Q: In your answer to Q366, you state: "ROBOTS may "launch" if they're in contact with the SWITCH FENCE." This seems to be in conflict with the answers to Q359 (touching the plane is not intersecting it) and G09 B (specifies that BUMPERS must be contacting the FENCE). Is it legal to launch a POWER CUBE if any part of a ROBOT is in contact with the FENCE attempting to place a POWER CUBE on the nearest PLATE of that FENCE's SWITCH?

A: The contact described in the original answer to !Q366 was intended to refer to BUMPER contact. The answer has been updated to clarify.

(Asked by **4028** at Feb 28th 18)

Q376 RE: Q271, R01, 02, 03. Signage thickness and the measurement of the robot perimeter.

Q: In past years, inspectors required that the signage be shown at inspection but they never measured it, as the rules only address frames and bumpers FRC 423 has passed pre-inspection with a perimeter exactly at the max width 28" and length 33". If we follow precedent attach the 3/16" thick signage using velcro, our the result will be 3/4" too wide and 3/8" too long. Will the the required signage be allowed to exceed the max frame measurements, perhaps under the bolt protrusion exception ? Tx

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Beyond the BUMPER numbers per !R28, there is no additional exterior marking or signage required on the ROBOT. Per !I03, when presented for Inspection "the ROBOT must be presented with all MECHANISMS (including all COMPONENTS of each MECHANISM), configurations, and decorations that will be used on the ROBOT without re-inspection". Any signage would need to be presented at Inspection and would likely need to be installed on the ROBOT unless the Inspector can verify compliance with all rules when installed, without it actually being on the ROBOT. Note that while !R01 uses the term FRAME PERIMETER, this term has a specific definition and when combined with !R02 definitely imposes restrictions on things teams may not typically refer to as "frame". The protrusion exceptions in !R01, !R02, and !R03 are only for minor protrusions (e.g. bolts, welds, small bearing protrusions, etc.) and must be less than 1/4" beyond the measured dimensions. While the final call will be made by the LRI, it is unlikely that signage would be considered a minor protrusion.

(Asked by **423** at Feb 28th 18)

Q377 Null Territory in Auto Period

Q: Are Null Territories assigned to each alliance in Auto Period? Would G16 apply if a robot were to accidentally

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enter the wrong Null Territory during the Auto Period and make contact with an opposing robot?

A: Yes and yes, !G16 applies throughout the MATCH, and the MATCH starts when the AUTO stage starts.

(Asked by **1746** at Mar 1st 18)

Q378 Can you weigh your robot in the bag

Q: Provided you do not take the robot out of the bag, are you allowed to weigh it on a scale in your own shop?

A: Sure.

(Asked by **2168** at Mar 2nd 18)

Q379 Clarification on R100 Dimensions

Q: "The OPERATOR CONSOLE must not be deeper than 14 in. (~35 cm) (excluding any items that are held or worn by the DRIVERS during the MATCH)". If your operator console was a plastic case with a lid and it fits the dimensions closed, but when the lid is open it extends the depth past 14in. Would this violate R100 or would it be ok sense the lid does not add to the foot print of the operator console resting on the driver station.

A: If the lid must be open for the OPERATOR CONSOLE to also comply with !R98, then yes it would be a violation of !R100.

(Asked by **346** at Mar 2nd 18)

Q380 Bumpers - Reuse

Q: Are we allowed to use bumpers from previous years robots?

A: Yes, per !R14-B

(Asked by **5144** at Mar 3rd 18)

Q381 NULL TERRITORY Tech Foul

Q: If a blue robot is pushed into the red NULL TERRITORY by a red robot does this constitute a violation of G16?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Note that for contact in the red NULL TERRITORY to be a violation of !G16, the red ROBOT must have bumpers breaking the plane of the NULL TERRITORY. If a REFEREE believes that the Red ROBOT (in your example) was pushing Blue ROBOT in a manner that violated !C07, then Blue ROBOT would not be subject to !G16.

(Asked by **95** at Mar 6th 18)

Q382 R30 Part "E" Clarification

Q: R30 Part "E" allows for aluminum angle to be used to clamp fabric to bumper. Would an aluminum strap/bar (0.125" X 1" X length of bumper side) be allowed to serve the same purpose mounted to the back of the bumper?

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Or will that have to be replaced with aluminum angle?

A: No, aluminum strap or bar is not aluminum angle and would not be permitted per !R30-E.

(Asked by **364** at Mar 6th 18)

Q383 Building Hours at a Regional

Q: If I read the Game Manuel correctly, we are allowed to build on robots at a regional until the pits close, is this true? For instance, if a team loses in the quarterfinal matches, can we build on our robot until the pits close? And can we use the practice field for testing purposes?

A: Yes, teams may continue to work on their ROBOT as long as pits are open, even if they have no remaining MATCHES at that event. The availability of the practice field is not guaranteed. If a practice field is available, there are no rules that would prohibit it's use, however please note that venue or event guidelines may restrict this if volunteers are not available to ensure safety.

(Asked by **3277** at Mar 6th 18)

Q384 Bumpers plywood backing - pockets for screw heads

Q: R01 says minor protusions no greater than 1/4" such as bolt heads, fastener ends....are not part of the framer perimeter. Note: encourage a tight, robust connection between the bumpers and the frame perimeter R30 A.be backed by 3/4" nominal thick plywood, solid, robust wood R30 G attached....rigid fastening system Is it acceptable to cut small pockets, only the depth or the 1/4" protruding screw or bolt head to allow the bumper to fit flush to the frame perimeter?

A: Yes, per the second sentence of !R30-A, this is permitted.

(Asked by **1261** at Mar 6th 18)

Q385 KOP Bumper Brackets as "Minor Protrusions" or "Frame Perimeter"

Q: We competed at the Utah Regional where we watched a team fail inspection per R03 as their use of the KOP (am-3674) bumper mounting brackets were declared greater than 1/4", not a minor protrusion and caused their robot frame perimeter to exceed the maximum starting configuration. Will these bumper brackets be consistently declared as frame perimeter at all future events? We would be able to advantageously modify our bumpers and want to confirm that inspections will be uniform.

A: We cannot comment on part/design legality, previous calls of Head REFEREES or LRIs. Please consult [Section 1.8]

(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc503284526) and, if needed, resubmit a different question.

(Asked by **6358** at Mar 15th 18)

Q386 Bumper Numbers on a Corner

Q: Would it be legal to wrap team numbers around a 90 degree angle on a bumper or would this be a sharp angle and violate R28-B?

A: A 90 degree angle would be considered a sharp corner of the FRAME PERIMETER per the description in !R28-B. Wrapping numbers around this corner would not be legal.

(Asked by **3036** at Mar 7th 18)

Q387 Push fit Pnuematic Solenoids

Q: A pneumatic solenoid we are looking at using has push fit connectors installed directly on the body of the solenoid, and as such has no NPT connector size. The manual only explicitly places restrictions on NPT fitting sizes, would a solenoid with 1/4" push fit connectors be legal?

A: Yes, 1/4" push-to-connect is smaller than 1/8" NPT and is therefore acceptable per !R83-D.

(Asked by **1982** at Mar 8th 18)

Q388 Cubes Placed in Null Zone

Q: Would multiple alliance partners acting together to place cubes in their null territory be considered a violation of G12?

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. That being said, the SCALE and access to POWER CUBES are both major components of MATCH play. Keep in mind !G12 can apply regardless of the ALLIANCE to which the NULL TERRITORY is assigned.

(Asked by **1712** at Mar 12th 18)

Q389 7 days prior to competition unbag robot clarification

Q: Our team will compete next week for a district event. We will arrive 3/15 to set-up our pit and for inspection. Can we unbag the robot Thursday 3/8 being 7 days prior to the unbagging for inspection?

A: Yes, if pits are open for ROBOT work (i.e. you will be permitted to unbag) on 3/15, the first day you could unbag per !R19-H/!R20 would be 7 days prior which is 3/8.

(Asked by **5675** at Mar 8th 18)

Q390 bulk upload signed consent/release forms

Q: Is there a way to do a bulk upload of student/parent signed consent/release forms?

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. Please contact firstroboticscompetition@firstinspires.org for help.

(Asked by **5144** at Mar 8th 18)

Q391 Drivers' station image does not load on new drivers' station netbook.

Q: We purchased the specified ACER E 11 netbook to replace our damaged classmate drivers' station PC. We attempted to download and install the image from FIRST, but with the image installed. The computer will not boot. Can we manually install Windows, and whatever software is necessary to run the drivers' station? What software is needed? What version of Windows? Or, where could we get a functional image?

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. For technical assistance, please visit the [FIRST Forums](http://forums.usfirst.org/forumdisplay.php?23-FIRST-Robotics-Competition).

(Asked by **522** at Mar 11th 18)

Q392 Bumper Zone

Q: Re Q385 - if the plywood had been relieved 1/4" to accommodate the brackets (plywood now against frame) would it have been acceptable? 5" x 2.5" (+/-) x 0.25"

A: !R30-A does permit small clearance pockets or access holes in the BUMPER backing, however these would not effect the legality of any BUMPER design with regards to other rules such as !R32 as the maximum FRAME PERIMETER protrusion permitted in !R03, 1/4 inch, matches the maximum gap permitted between BUMPER and FRAME PERIMETER per !R32-A.

(Asked by **4248** at Mar 15th 18)

Q393 Question regarding Cube Possesion

Q: Hello, If we were to use another cube to force the cube in our possession of our intake up would this be considered a double cube possession foul?

A: We cannot comment absolutely on whether or not this action would be a violation of !G22. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Intentionally controlling a POWER CUBE while another is in the ROBOT'S possession is a violation of !G22.

(Asked by **4130** at Mar 13th 18)

Q394 Maximum Crate Size

Q: The 2018 Shipping Crate Construction document specifies in the sizing information section that crates may not be more than 60" high. However, the same document also specifies in the construction information section that the crate must "'Sit' on 2 pieces of 4" x 4" lumber". Does the 60" height limit include the two pieces of 4" x 4" lumber, or is the 4" x 4" lumber not included in the 60" height limit?

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. Please contact frclogistics@firstinspires.org.

(Asked by **1410** at Mar 13th 18)

Q395 Bumpers plywood backing and hardware

Q: Is it permissible to route a shallow pocket (1/8" deep X 1" wide X length of bumper) in the backside of the plywood backing of a bumper to inset a piece of aluminum angle permanently attached to the bumper? The aluminum angle is used to mount the bumper to the robot and inseting it allows the rest of the plywood backing to rest firmly against the bumper mounts attached to the robot. To clarify, the aluminum angle extends from the back of the bumper into the robot and is in the bumper zone.

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. Generally a slot routed down the entire bumper would be unlikely to qualify as a "small clearance pockets and/or access holes in the plywood backing" permitted by !R30-A.

(Asked by **832** at Mar 19th 18)

Q396 Can a coach operate the exchange rollers?

Q: May a Coach operate the rollers on the exchange if they never come into contact with a powercube?

A: There are no rules prohibiting a COACH from operating the conveyor rollers.

(Asked by **1712** at Mar 19th 18)

Q397 Is R22 the 30lb Withholding Allowance per Event or Season

Q: Can we have 30lbs of withholding allowance for a 1st event and then another 30lbs with different items for a 2nd event?

A: Yes, the WITHHOLDING ALLOWANCE for each event a Team participates in may be unique. However, for each event, the total WITHHOLDING ALLOWANCE is 30 pounds.

(Asked by **5507** at Mar 19th 18)

Q398 G25 "Repeated" clarification

Q: The gray text in G25 says that "Repeated or extended violations" may result in yellow or red cards. What is the definition of "repeated or extended"? My question mainly is asking if "repeated" transcends individual matches and applies if a robot violates the rule once in one match and once in another. Additionally, could a momentary tap of the scale plate result in a yellow or red card?

A: Repeated can transcend multiple matches, and Head REFEREES do their best to communicate to the team after a violation if a future violation may escalate to a CARD. That being said, we cannot comment absolutely on hypothetical scenarios (such as "tapping a scale plate"). The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE.

(Asked by **303** at Mar 19th 18)

Q399 Pneumatics Storage Tanks

Q: Will use an off board compressor with separate accumulators. Will conform to R94 and R96. Please confirm

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that R91 would permit an isolation valve that can be closed after filling both sides from one fill port vice duplicating the switch, indicator, and fill port? Separate relief valves will be on both sides in the spirit of R93. If the isolation valve is used it requires either two valves to be open to vent all pressure or a separate relief valve on the far side. Would either violate R95A?

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. !R91 does not address use of "isolation valves," only the gauge and pressure switch. As you've probably seen, !R95-A requires that all compressed air on the ROBOT can be vented via its one relief valve. Implementation that requires two relief valves to vent ROBOT compressed air is a violation of !R95.

(Asked by **620** at Mar 26th 18)

Q400 Are 5A breakers allowed even though they are not on the Inspection Checklist?

Q: Is it FRC legal to use 5A breakers on the PDP with wire of 22 SWG or greater diameter, even though 5A breakers are not specifically indicated on the 2018 FRC Inspection Checklist? My reading of R58 (in the blue box) and R59 indicates 5A breakers are legal, however, twice in the last three years, we have been asked to replace our 5A breakers with 20A breakers, by inspectors who read the Checklist as only allowing 20A, 30A, & 40A breakers.

A: Yes. 5A breakers can legally be used in the PDP with wire of 22 SWG or greater diameter.

(Asked by **846** at Mar 26th 18)

Q401 Frame between bumpers touching fence launching cube

Q: Related to Q359. Would it be a foul when launching a cube if the frame between bumper sections is touching the corner of the fence? It seems ridiculous if that was the case. Possibly change the rule to add robot frame touching the corner of the fence. Details: The corner of the fence would be the only place the frame could touch the fence in normal game play. Only a 13" to 14" gap between the bumpers. Nearly impossible for referee to see that neither bumper was touching.

A: Part G is the only part of !G09 that references other parts of the ROBOT besides its BUMPERS (so in your question, the ROBOT frame) and allows for launching if any part of the ROBOT is intersecting the vertical planes defined by the SWITCH FENCE (!Q359 clarifies that reaching the plane is not intersecting the plane). The Q&A system is not intended for critique or suggestions; please email [the FRC Team Advocate] (<mailto:frcteamadvocate@firstinspires.org>) to share such content. Thank you.

(Asked by **4061** at Mar 26th 18)

Q402 Pneumatics Systems

Q: Can you identify any rule that would prevent having two completely independent pneumatic systems on the robot? The first would be configured with an on-board compressor. The second would be configured as an off-board compressor but would be charged before the match using the compressor for the on-board system.

A: Please see !R95-A

(Asked by **620** at Mar 27th 18)

Q403 What is a "fully supported" power cube?

Q: Per Section 4.1.2 MATCH Setup, a pre-loaded POWER CUBE must be "fully and only supported by the ROBOT". If a POWER CUBE is fully supported by the robot and is then pushed up against the alliance wall such that the cube makes contact with the wall but does not move or push against the wall, is the POWER CUBE still fully supported by the robot. In other words, can a POWER CUBE be making contact with the alliance wall and not be considered supported by the alliance wall.

A: We cannot comment absolutely on hypothetical scenarios. The ultimate decision would be determined by the REFEREES at your event, with the final call made by the Head REFEREE. Generally, if a POWER CUBE is merely touching the ALLIANCE WALL such that, if the wall weren't there, the POWER CUBE would not move, it meets the criteria described in [Section 4.1.2]
(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc506566486) and !G01-H.

(Asked by **842** at Mar 27th 18)

Q404 Multiple Pneumatic Systems

Q: So based on your answer to Q402, if a single manual valve operation can vent all the pressure across multiple pneumatic systems to conform to R95-A then there is no other rule that would prevent multiple independent pneumatic systems from being installed and operated simultaneously on the same robot?

A: We cannot rule absolutely on hypothetical ROBOT designs, and the final decision as to legality of a particular ROBOT lies with the Lead ROBOT Inspector (LRI) at each event. There is no definition of or legislation that targets the concepts of "single" or "multiple" pneumatic systems. Provided all pneumatic rules are met, you shouldn't have any issues. If you think a particular rule is unclear, please submit a question about that rule.

(Asked by **620** at Mar 28th 18)

Q405 Uniformity of Switch/Scale randomization

Q: According to section 4.1.1, the field is randomized to one of four configurations. No indication is given as to whether the distribution of these configurations is uniform (that is, each has an equal chance of occurring.) Is it intended that each of these configurations has an equal chance of occurring in any given match? If so, how do you reconcile the extreme deviation from a uniform distribution: (percents collected from the event data API) RRR: 22.55% LLL: 21.33% RLR: 32.53% LRL: 23.59%

A: ****Update: 4/10/18**** The plates are randomized into one of four patterns, there is no consideration or compensation to guarantee that any individual pattern will appear an equal number of times. However, we too have noticed the RLR pattern appearing more frequently over the thousands of matches that have already been played this season, and we are looking into it. ****As announced in [Team Update 21]**
(<https://firstfrc.blob.core.windows.net/frc2018/Manual/TeamUpdates/TeamUpdate21.pdf>), as of week 6 events, a patch has been deployed that results in more uniform PLATE pattern distribution.**

(Asked by **3184** at Mar 29th 18)

Q406 Robot alignment tool/device allowed just for initial setup

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Q: Relating to rule H07, while setting the robot, may a team use and then remove before the match starts, an alignment device to ensure their robot has the correct placement and alignment relative to a field element such as a power cube, field tape, wall, etc.? Can this alignment device be a stick, measuring tape, carpenter's square, or even a laser measure?

A: There are no rules that prevent this, though please consider the repercussions, per !G02, for setups that delay the start of a MATCH.

(Asked by **2974** at Mar 28th 18)

Q407 Emergency Stopped Robots and Fouls

Q: If a robot becomes stuck in a situation where the drive team deems it necessary to "E-Stop" the robot to disable it, will the robot still accumulate foul points? For example, if a robot becomes inoperable while in violation of G25 and the drive team hits the Emergency Stop, will the robot continue to cause a tech foul every 5 seconds if they are still in violation after the robot is disabled?

A: The status of a robot (e-stopped, bypassed, etc) has no impact on the REFEREE'S enforcement of the rules, therefore yes a ROBOT can violate G25 while E-stopped.

(Asked by **6352** at Mar 29th 18)

Q408 Stickers on Aluminum tank

Q: We are using an aluminum 5 Gallon tank for air storage on our robot. It passes all needed specifications per the manual. We have put our sponsors logo's on the tank as this is the only place we have for them. Per the rules, you cannot change or alter bought pneumatic components and no stickers can go on the black plastic tanks because of the fear that the adhesive will damage the plastic tanks. Our question is, can we put our logo stickers on our aluminum tank?

A: Application of stickers is not a permitted modification listed in !R82, regardless of tank material.

(Asked by **3534** at Apr 3rd 18)

Q409 If a 9th seed team declines an invitation can they still shift into the 8th seed position?

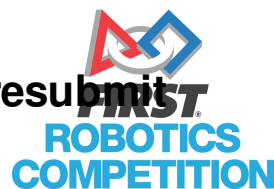
Q: If a 9th seed team declines an invitation can they still shift into the 8th seed captain position if and when another set of captains merge? Example. 1 invites 9, 9 declines. 1 invites 2 and 2 excepts. Will 9 now become the captain at 8?

A: Yes. In your scenario, the 9 seed team would move up to become the ALLIANCE Eight Lead per [Section 10.5.1]
(https://firstfrc.blob.core.windows.net/frc2018/Manual/HTML/2018FRCGameSeasonManual.htm#_Toc506566523).

(Asked by **3244** at Apr 4th 18)

Q410 Won a Regional Chairman's Award and do we have to resubmit our video for Championship

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Q: Can we edit the video we submitted at our Regional and bring a new copy to the Championship? or was it submitted electronically from our Regional?

A: Yes, you may edit the video and re-submit your video at the *FIRST* Championship (and please note you must bring a copy of your Chairman's video to the *FIRST* Championship). Only essays are forwarded from the local event.

(Asked by **2341** at Apr 5th 18)

Q411 Specification of bumper material colors

Q: We are using this fabric on our robot: <http://www.rockywoods.com/1680D-Coat...pellent-Finish> We have used in the past, and other teams have used in the past, including at Champs. At CVR yesterday, an inspector told us they thought we have to make new bumpers as these are the wrong color for Champs, we have to use the Andy Mark fabric. It was not mentioned at our earlier competitions.

A: We cannot rule on the legality of specific products, but BUMPER materials need not be purchased from a particular supplier. The only requirement for BUMPER color, as outlined in !R27, is "red" and "blue". If you believe there may be a question as to whether your fabric is red/blue, it may be appropriate to bring documentation indicating that the material is sold as the appropriate color.

(Asked by **649** at Apr 11th 18)

Q412 Championship Playoff Order of Placement

Q: Per Section 4.1.2, an alliance may request alternating robot placement be enforced during match setup. During Playoffs, the order of placement is to be determined by the higher seeded alliance. How is the higher seeded alliance defined during the Championship Playoff Round Robin tournament?

A: The Red Alliance is the higher seeded alliance, and will place last, in Round Robin matches.

(Asked by **5803** at Apr 11th 18)

Q414 G18 protection and Extensions allowed by G05

Q: As part of its climbing sequence, a robot extends part of itself into the volume under the SCALE ARMs and above the OUTRIGGER's outward faces. Is it permissible for the opposing alliance to contact them as they are no longer protected by G18? And does that robot get a yellow or red card for breaking G05 if they have an extension greater than 16" past their frame perimeter at the time?

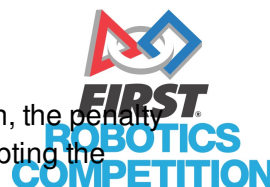
A: If a ROBOT is no longer "completely contained within their ALLIANCE'S PLATFORM ZONE" it is no longer protected by !G18. We cannot rule absolutely on hypothetical scenarios, as other rules could additionally apply regarding your !G05 scenario, and the final decision would be made by the Head REFEREE at the event.

(Asked by **5012** at Apr 11th 18)

Q415 G-16 Violation during Auto

Q: We are concerned violating G-16 during autonomous will become commonplace, because, often, the penalty for violating G-16 during autonomous is inconsequential compared to advantage gained from disrupting the

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opponent from placing cubes on the scale during autonomous. This type of G-16 violation feels against to spirit of autonomous, so we are seeking clarification or possible modification of the G-16 penalty during autonomous, to ensure autonomous remains a genuine reflection of team ability.

A: The purpose of this Q&A is to answer questions regarding the rules of _FIRST_ POWER UP. For other comments, please email [frcteamadvocate@firstinspires.org](frcteamadvocate@firstinspires.org)

(Asked by **1318** at Apr 11th 18)