

## Q1 Drones and backdrop

**Q:** When having a discussion of the rules about the backdrop and drones. Several students questioned what would happen if a drone went back and hit the backdrop and knocked down pixels of the opposite alliance. Would there be a penalty for the drone hitting the backdrop.

**A:** The \*Pixel\* descoring rule, GS04, applies to this gameplay scenario. A \*Minor Penalty\* will be assessed for each \*Pixel\* descored from the opposing \*Alliance's Backdrop\*.

( Asked by **130** answered Sep 18th 23 )

## Q2 Spitting out a third pixel

**Q:** Per rule robots can't possess/control more than 2 pixels, and doing so results in a minor penalty for each additional pixel as well as another minor penalty after every 5 seconds. Q1: We were wondering if there is an exception to be made for intaking a 3rd pixel and immediately spitting it back out. Q2: Additionally, if such an exception is the case, are there limitations on our actions while the 3rd pixel is in our possession/control? (ex. driving)

**A:** A1: Yes there is an exception. The \*Robot\* in this scenario is unlikely to be \*Penalized\* for \*Controlling\* too many \*Pixels\*. The referee should view the \*Robot's\* actions as being both \*Inadvertent\* and \*Inconsequential\* and not call a rule GS05 \*Penalty\* as allowed by rule G10. A2: Yes, for this scenario, there are limitations to being excused for a rule GS05 \*Penalty\*. The \*Robot\* is unlikely to receive a rule GS05 \*Penalty\* if the \*Robot\* satisfies the following two conditions: 1) It ejects the extra \*Pixel\* in a reasonable amount of time and; 2) It refrains from playing the game while \*Controlling\* the extra \*Pixel\*. Two examples of playing the game are: a) Traveling to a different location and; b) Placing a \*Pixel In\* a \*Scoring Area\*. If the \*Robot's\* actions are clearly focused on removing the extra \*Pixel\* and not playing other aspects of the game, it is highly unlikely that it will receive a GS05 \*Penalty\*.

( Asked by **19458** answered Sep 19th 23 )

## Q3 GS06 Rigging clarification

**Q:** Q1: Are the yellow tubes on the truss considered rigging or just the red / blue tubes? Q2: The rule states: "There is a limit of one (1) Supported Robot per Rigging." Is this per tube, or the entire Truss? Q3: Asked another way, is it possible for two alliance robots to hang from the Truss - each on a different alliance colored tube?

**A:** A1: The red and blue pipes are the \*Rigging\*. The yellow pipes are not \*Rigging\*. See illustration C-4 in Appendix C of Game Manual Part 2. A2: The rule GS06.c limitation is per tube. There are four (4) \*Alliance Specific Riggings\*, two (2) red and two (2) blue as stated in the definition of \*Rigging\* in the game definitions section (4.3) of Game Manual Part 2. A3: Yes.

( Asked by **20079** answered Sep 19th 23 )

## Q4 Game scoring elements in wing

**Q:** line c: Human Players may place a maximum of two (2) Pixels or one (1) Drone In a Wing at a time. This has "or". Is this in one human action? An action being human placing one or two elements, and pull back outside boundary, Other rule, line d has 6 elements in wing.

**A:** Yes, the rule GS12.c limitation is per "human action". The \*Human Player\* may place into the \*Wing\* either one (1) \*Pixel\*, two (2) \*Pixels\*, or one (1) \*Drone\* during a single action. The \*Human Player\* must be \*Outside\* the \*Playing Field Perimeter\* between cycles of placing objects into the \*Wing\*.

( Asked by **20079** answered Sep 19th 23 )

## Q5 line c) Control/Possession limit exceptions:

**Q:** line c): i. Knocking over a stack ... Pixels is allowed. ii. Inadvertent and Inconsequential movement of a pre-set stack of unscored Pixels is allowed. Moving the stack Completely Off the tape is considered consequential. iii. Plowing through ... is allowed. Q1: Does the "Moving the stack Completely Off the tape" apply to the entire stack, or is a single pixel on the stack able to be moved past the tape edge? Q2: If knocking over, can more than one pixel?

**A:** The intent of Rule GS05.c.(i&ii) is to allow reasonable \*Robot\* interaction with a \*Pixel\* stack without violating the \*Pixel Control/Possession\* limits described in rule GS05.a. The Rule GS05.c.i exception is for \*Pixel(s)\* knocked off of a stack and onto the \*Playing Field Floor\*. The Rule GS05.c.ii exception is for the movement of three (3) or more of the pre-set stacked \*Pixels\* as a group that stay \*On\* the white tape line. A1: Penalizing the movement of the \*Pixel\* stack applies when three (3) or more stacked \*Pixels\* are moved all together \*Off\* of the white tape line. Moving a "single \*Pixel\* from the stack past the tape edge" is allowed because it is less than the two (2) \*Pixel Controller/Possession\* limit described in rule GS05.a. A2: Yes, the rule GS05.c.i exemption applies to any number of \*Pixels\* knocked off of the stack onto the \*Playing Field Floor\*. The knocked off \*Pixels\* are not subject to rule GS05.a constraints, even if they come to rest \*Off\* of the white tape line. \*\*Bonus Information:\*\* \*Pixels\* in the pre-set stacks can't be \*Propelled\* per rule GS10.

( Asked by **20079** answered Sep 19th 23 )

## Q6 Crossing Center Line

**Q:** Centerstage game setup has stacks of white pixels on both sides of the field. Is a robot able to use the stacks across the field centerline during autonomous?

**A:** Yes, however, this is a risky \*Autonomous Period\* gameplay strategy. A \*Robot\* entering the opposing \*Alliance's\* half of the \*Playing Field\* during the \*Autonomous Period\* risks violating rule GS03.

( Asked by **20079** answered Sep 19th 23 )

## Q7 Pixel stack orientation on location line

**Q:** Will the pixels be placed on the pixel locations stripes in a known orientation such as flat against the wall or is the orientation random?

**A:** Based on the Field Reset guide located in the Game and Season Information page (<https://www.firstinspires.org/resource-library/ftc/game-and-season-info>), "Each stack of 5 \*Pixels\* is centered from side to side on each of the white tape lines on the audience side of the field. The \*Pixels\* should be touching the field perimeter wall". There is no specification of orientation both collectively and individually in each stack. In other words, \*Pixels\* can be in any setup as long as they are each touching the field perimeter wall. Teams should design their intake mechanisms accordingly.

( Asked by **5484** answered Sep 19th 23 )

## Q8 Launching a Drone from Robot Suspended from Rigging

**Q:** Section 4.4.4.2 End Game states that launched drones must pass over the rigging and/or stage door to be considered for scoring, which seems reinforced by GS11e. GS11d seems to consider drones launching from suspended robots separately. Does a drone launched from a suspended robot need to pass over the rigging/stage door to score?

**A:** Yes.

( Asked by **18240** answered Sep 19th 23 )

## Q9 Wing Constraints - Is there a maximum number of drones allowed in the wing?

**Q:** Doesn't address the maximum number of drones allowed in the wing. Does this mean there is no limit?

**A:** A maximum of two \*Drones\* are allowed to be placed in their corresponding \*Alliance's Wing\*. \*\*Bonus Information:\*\* Each \*Team\* is allowed to provide only one (1) \*Drone\* for a \*Match\*.

( Asked by **23410** answered Sep 19th 23 )

## Q10 Pre-Match configuration - drone storage

**Q:** 4.4.1 specifies pixel storage but says nothing about drone storage. Are there any constraints on the quantity or starting location/configuration of drones in excess of the one pre loaded prior to the start?

**A:** \*Drive Teams\* are allowed to bring one (1) \*Drone\* to the competition \*Playing Field\* for a \*Match\*. The \*Drone\* is either \*Pre-Loaded\* or placed into their \*Alliance's Pixel Storage\* area during pre-\*Match\* set up.

( Asked by **23410** answered Sep 19th 23 )

## Q11 Section 4.4.4 end game and e. Drone must pass over the Truss or Stage Door

**Q:** Per the rules, for each scoring attempt (Launch, fly, land), a Launched Drone must pass over a Rigging or top pole of the Stage Door before it is eligible to Score points. May a Drone pass over a Rigging or top pole of the Stage Door MULTIPLE times during a launch, fly, land sequence?

**A:** Yes.

( Asked by **23410** answered Sep 19th 23 )

## Q12 Legal or illegal build kits.

**Q:** Can you inform me if Go Bilda build kits have been deemed illegal? There is no mention of them in the legal or illegal parts and I spent a lot of money upgrading this winter to try and compete.

**A:** Teams may acquire parts and materials from any readily available source, including GoBilda, providing they do not violate any robot build rules. Pay specific attention to Rules RM01 and RM02 when purchasing parts and kits.

( Asked by **16610** answered Sep 19th 23 )

## Q13 GS05 - Robot Control/Possession Limits for Pixels

**Q:** Please explain if these scenarios will be penalized: Q1: Robot knocks a pixel stack down (GS05.c.i). These pixels are such that they are no longer stacked and are scattered singles. Q2: Robot pushes 3/4/5 of the knocked down pixels into the backstage (GS05.c.iii). Q3: The restriction seems to be, a robot can not move a stack of 3 or more pixels from the white line. Q4: Scattered / knocked off pixels can be plowed. Is that accurate?

**A:** A1: No \*Penalty\*. Rule GS05.c.i allows a \*Robot\* to knock over a stack of unscored \*Pixels\*. A2: The \*Robot\* will be penalized for violating rule GS05.a because it is \*Controlling\* more than two (2) \*Pixels\*. The \*Pixels\* in this scenario are \*Herded\*, a form of \*Control\*, by the \*Robot\* because the \*Pixels\* are pushed to a desired location that gains a strategic advantage beyond the \*Robot\* moving around the \*Playing Field\*. The \*Pixels\* in this scenario do not qualify for the rule GS05.c.iii exception for \*Plowing\*. See the definitions of "\*Herding\*" and "\*Plowing\*" in section 4.3 of Game Manual Part 2 to fully understand the difference between these game-specific terms. A3: Correct, a \*Robot\* will be penalized for moving a stack of three (3) or more \*Pixels Off\* of the white tape line per rules GS05.a and GS05c.ii. A4: Yes, any quantity of "scattered/knocked off \*Pixels\*" can be \*Plowed\* per rule GS05.c.iii. See the definition of "\*Plowing\*" in section 4.3 of Game Manual Part 2 to gain an understanding of how to apply this game-specific term.

( Asked by **21816** answered Sep 19th 23 )

## Q14 Launching Pixels

**Q:** Launching is defined as "Propelling Game Elements through the air or water above the Playing Field Floor." Q1: Are Pixels considered launched if they stay in contact with the floor? Q2: In other words, can be slid along the floor and not be considered Launched and if so, are there any constraints in how far they can go?

**A:** An understanding of the game-specific defined terms **"\*Propel/Propelling\*"**, **"\*Launch/Launching\*"**, and **"\*Slide/Sliding\*"** found in section 4.3 of Game Manual Part 2 is necessary to fully understand Q1, Q2, and their answers. Please take a moment to review these definitions before proceeding. The "bonus information" following answers A1 and A2 addresses a related gameplay scenario that complements Q1 and Q2. A1: No, a **\*Pixel\*** that is "in contact with the floor" does not satisfy the definition of **"\*Launched\*"** in section 4.3 of Game Manual Part 2. A2: A **\*Pixel\*** "slid along the floor" does not satisfy the definition of **"\*Launched\*"** because the **\*Pixel\*** remains in contact with the "Playing Field Floor". **\*\*Bonus Information:\*\*** Rule GS10 states that **\*Pixels\*** may not be **\*Propelled\***. Each violation of this rule results in a **\*Minor Penalty\***. To understand how to apply rule GS10 to **\*Pixels\*** that are **\*Slid\*** by a **\*Robot\***, we need to review the definitions of **"\*Sliding\*"** and **"\*Propelling\*"**. **"\*Sliding\*"** is defined as **\*Propelling Game Elements\*** along the **\*Playing Field Floor\***. **"\*Propelling\*"** is giving **\*Game Elements\*** enough force such that they move independent of contact with the **\*Robot\*** or **\*Human Player\***. **\*Launching\***, **\*Rolling\***, and **\*Sliding\*** are forms of **\*Propelling\***. Since **"\*Sliding\*"** is a form of **"\*Propelling\*"**, a **\*Robot\*** causing a **\*Pixel\*** to **\*Slide\*** violates rule GS10.

( Asked by **15259** answered Sep 20th 23 )

## Q15 Are light blue and pink legal Prop colors?

**Q:** TE02 says that the TGE (Prop) may include multiple shades of the assigned color, but can the Prop be made entirely of a shade of the assigned color? So, could a Prop be light blue or pink since those are shades of blue and red?

**A:** Yes, light blue and pink are acceptable colors providing it is obvious to the field personnel which alliance the Team Prop belongs to.

( Asked by **16626** answered Sep 20th 23 )

## Q16 Drone Launching

**Q:** How is "over" defined for the purpose of <4.4.4.2> "Launched Drones must pass over the Truss and/or Stage Door for each scoring attempt to earn points." Specifically, does the drone need to be fully clear of touching its launching robot before the leading edge of the drone passes the plane over the Rigging or before the trailing edge leaves the plane above the Rigging?

**A:** A **\*Robot\*** must release the **\*Drone\*** (i.e, no **\*Drone\*** contact with the **\*Robot\***) before any part of the **\*Drone\*** passes over the **\*Rigging\*** or top pole of the **\*Stage Door\***. The following text demonstrates how to use the Game Manual to substantiate the answer. The answer to the question is found by applying the game-specific definitions of **"\*Launch/Launching\*"** and **"\*Propel/Propelling\*"** found in section 4.3 of Game Manual Part 2 to rule GS11.e. Rule GS11.e states that "for each scoring attempt (**\*Launch\***, fly, land), a **\*Launched Drone\*** must pass over a **\*Rigging\*** or top pole of the **\*Stage Door\*** before it is eligible to **\*Score\*** points. The key point is that the **\*Drone\*** must be **\*Launched\*** before passing over the specified **\*Game Elements\***. Next, we need to understand and apply the definition of **"\*Launch\*"**. **"\*Launch/Launching\*"** is defined as **\*Propelling Game Elements\*** through the air or water above the **\*Playing Field Floor\***. Okay, now we need to review the definition of **"\*Propelling\*"**. **"\*Propel/Propelling\*"** is defined as giving **\*Game Elements\*** enough force such that they move independent of contact with the **\*Robot\*** or **\*Human Player\***. Therefore, a **"\*Launched\*"** **\*Drone\*** is no longer touching the **\*Robot\***.

( Asked by **15259** answered Sep 20th 23 )

## Q17 FTC machine learning Tool chain: Start Training Model not getting enabled?

**Q:** I followed all process mentioned on FTC machine learning Tool chain manual ([https://ftc-docs.firstinspires.org/en/latest/ftc\\_ml/index.html](https://ftc-docs.firstinspires.org/en/latest/ftc_ml/index.html)) to train and creating videos and Datasets with same Label but still "Start Training model" button is disable? Has anyone faced this problem?

**A:** Welcome to FIRST Tech Challenge! As a new (and even veteran!) team it can be difficult to know where to turn for help. Officially there are four places to get official information and help in FIRST Tech Challenge: (1) Weekly [FIRST Tech Challenge Team Blasts](<https://www.firstinspires.org/resource-library/ftc/team-blast- archive>) - Every week FIRST Tech Challenge provides the information teams crave! The archive gets updated periodically, but teams receive the emails each week with helpful Weekly Tech Tips (new!) and updates teams need to know. (2) Periodically [FIRST Tech Challenge Blog](<http://firsttechchallenge.blogspot.com/>) and [FIRST Tech Challenge Social Media](<https://www.facebook.com/FTCTeams/>) - The Blog is FIRST Tech Challenge's place to talk more in-depth about topics of interest to FIRST Tech Challenge teams, and is updated periodically. Also the Social Media ([Facebook](<https://www.facebook.com/FTCTeams/>), [Instagram]([https://www.instagram.com/first\\_official\\_/?hl=en](https://www.instagram.com/first_official_/?hl=en)), [Twitter/X](<https://twitter.com/FTCTeams>), etc...) is a way to keep up with topics of interest. (3) On-Demand [FTC-Community Forums](<https://ftc-community.firstinspires.org/>) - The FTC-Community forums are the official FIRST Tech Challenge forums for technical questions and help. This forum uses the same credentials that you use to access the FIRST Dashboard, and the forum is monitored by FIRST Tech Challenge Engineering Staff as well as the FIRST Tech Challenge Tech Team (as well as the Community!). If you've got a technical question, we technically have an answer! FTC-ML questions are absolutely welcome in the FTC-Community forums. (4) On-Demand [FIRST Tech Challenge Question and Answer System](<https://ftc-qa.firstinspires.org/>) - That's this site you're using right now. This system is designed to help teams get clarification on game-specific questions. No other forum or system can give you official game-specific answers like this! This system also isn't designed for discussions like the FTC-Community forums are. I hope this helps. Have a great season!

( Asked by **23292** answered Sep 22nd 23 )

## Q18 Suspend at end of the match

**Q:** Q1: Does a robot have to be suspended at the end of the match to count for suspend points? Q2: Does the robot still get the points for suspending if they suspend from the rigging at end game, make it obvious and unambiguous, and then come down off the rigging and go on the floor?

**A:** The answers that you seek are found by reading the description of the **\*Robot\*** location tasks in Game Manual Part 2 section 4.4.4 **\*End Game\***. A1: Yes, to earn 20 points for being **\*Suspended from the Rigging\***, a **\*Robot\*** must be **\*Suspended\*** from the **\*Rigging\*** when the scoring system **\*Match\*** timer reaches zero seconds (0:00) remaining in the **\*Match\*** or at some point during the end of **\*Match\*** sound played by the scoring system. After the **\*Match\*** ends, the **\*Robot\*** may remain **\*Suspended\*** or lower to the **\*Playing Field Floor\*** without affecting the previously earned 20 points for completing the **\*Suspended from the Rigging\*** achievement. A2: No, a **\*Robot\*** located on the **\*Playing Field Floor\*** at the end of the **\*Match\*** (i.e., match time equals 0:00) does not satisfy the requirement of being **\*Suspended\*** by the **\*Rigging\*** at the **\*End of the Period\***. However, there is still time to complete the scoring achievement; the **\*Robot Suspension\*** task may still occur, provided that the **\*Robot\*** is **\*Suspended\*** by the conclusion of the end of **\*Match\*** sound played by the scoring system. **\*\*Note:\*\*** A1 and A2 were updated on November 6, 2023 to recognize that the end of **\*Match\*** buzzer length is a "grace period" for accomplishing the **\*Suspension\*** task.

( Asked by **14623** answered Sep 20th 23 )

## Q19 GoBilda Motor Legality

**Q:** Section of Game Manual Part 1 does not list any type of GoBilda motor as an allowed motor. Seeing how GoBilda advertises their motors as FTC legal, they have been widely used in previous years, and that they are a selectable option in the robot configuration, are the 5203 Series GoBilda motors FTC legal?

**A:** goBILDA motor/gearbox combinations utilizing the Modern Robotics/MATRIX 12V DC Motors, along with their attached single degree-of-freedom gearboxes, are legal per rule RE10c. This currently includes motor/gearbox combinations in the goBILDA Yellow Jacket 5201, 5202, 5203, and 5204 series.

( Asked by **5237** answered Sep 22nd 23 )

## Q20 Is it legal to intake 2 pixels while the robot is touching other pixels on a stack

**Q:** Is it legal to intake 2 pixels, while a robot's other parts (e.g. a beam) are touching other pixels on the pixel stack?

**A:** Yes, the \*Robot's\* actions are legal, provided that the \*Robot\* does not already \*Possess\* or \*Control\* any \*Pixels\* when it "intakes 2 \*Pixels\*."

( Asked by **21229** answered Sep 20th 23 )

## Q21 Drone Trajectory

**Q:** The rule states – "... the aerodynamic surfaces cause the Drones to follow a non-ballistic trajectory while flying." There is a non-zero chance that, unintentionally, the drone ends up flying with a near ballistic trajectory. **Q:** Does the team incur a penalty if this happens?

**A:** If the \*Drone\* has passed inspection and it remains in a legal configuration (rule GS11.f) throughout the \*Match\*, a gameplay penalty is not assessed if it flies with a "near ballistic trajectory." A referee may require the \*Drone\* to be reinspected before it is used in a subsequent \*Match\* if there is concern that it violates a construction rule.

( Asked by **23312** answered Sep 20th 23 )

## Q22 Drone construction by cutting up paper sheet into smaller parts.

**Q:** Rule Construction Material Constraints: states - "... The Drone must be made of a single, continuous sheet of paper no larger than a single sheet of 8 ½ x 11 or A4 size uncoated printer paper. ..." **Q1:** Can the paper size be smaller than the standard Letter/A4 size paper? **Q2:** Can the paper be cut up to make individual drone parts that are later attached together? Team members thought of an origami airplane that requires multiple separate parts that need to be joined together.

**A:** **Q1:** Yes, a Drone may be made from a single sheet of paper smaller than a standard letter/A4 sheet. **Q2:** No, multiple pieces of paper, even if in aggregate they are less than a standard letter/A4 sheet, are not allowed.

( Asked by **23312** answered Sep 21st 23 )

## Q23 Pixel pickup and dropoff to alliance robot?

**Q:** Can a robot pick up pixels in the wing and then drop the pixels in tile row 3 or 4 for another robot to pick up and place on the backdrop?

**A:** Yes, the \*Robot's\* actions do not violate any gameplay rules.

( Asked by **14687** answered Sep 20th 23 )

## Q24 Are stacked pixels pinned to the playing field wall considered controlled/possessed?

**Q:** Are stacked pixels pinned against the playing field wall considered controlled/possessed by the robot?

**A:** No.

( Asked by **19043** answered Sep 20th 23 )

## Q25 Exceptions to rule RM02

**Q:** Good evening. Provided no other rules are violated, which of the following kits are legal COTS items under the exception for COTS drive chassis? Assume that a "swerve module" is a collection of parts including a wheel and mechanisms to rotate the wheel in two axis. 1) A single "swerve module." 2) A bundle of 2 or more "swerve modules." 3) A complete "swerve" drivetrain, including 2 or more "swerve modules" and a frame, necessitating no additional parts to be assembled as a drive chassis.

**A:** **Q1:** A single swerve module kit does not meet the requirements in Rule RM02 and therefore is not legal. **Q2:** A bundle of swerve modules violates Rule RM02 and is not legal. **Q3:** A complete drivetrain made up of illegal parts is not legal.

( Asked by **16379** answered Sep 22nd 23 )

## Q26 Rule GS05.c.i clarification

**Q:** c) i. Knocking over a stack of unscored Pixels is allowed. **Q1:** Is knocking over more than one stack allowed? **Q2:** Is it also allowed to knock over the stacks in the opposing Alliance's half of the Playing Field? **Q3:** What is the penalty for knocking over more than one stack (if applicable)?

**A:** **A1:** Yes. **A2:** Yes this action is allowed during the \*Driver-Controlled Period\*. Knocking over a \*Pixel\* stack in the opposing \*Alliance's\* half of the \*Playing Field\* during the \*Autonomous Period\* violates rule GS03. **A3:** No penalty during the \*Driver-Controlled Period\*. During the \*Autonomous Period\*, each instance of knocking over a \*Pixel\* stack that affects an opposing \*Alliance Robot\* during the \*Autonomous Period\* is penalized per rule GS03. Note: The answers were updated on 09/21/2023.

( Asked by **21028** answered Sep 20th 23 )

## Q27 Adafruit NeoDriver LED controller legality

**Q:** Is the Adafruit NeoDriver, I2C to NeoPixel Driver Board, <https://www.adafruit.com/product/5766> legal to use for controlling addressable LED lights of the WS2812 variety (NeoPixels) The module would be plugged into and powered by the Control Hub's 5V auxiliary ports. Using a JST SH (Stemma QT) to PH cable, the NeoDriver would be connected to an I2C port on the Control Hub. The NeoPixel wires would be connected to the remaining 3 terminals, 5Vo, GND, and NEO (data).

**A:** Yes, per RE12.e

( Asked by **16464** answered Sep 22nd 23 )

## Q28 Gobilda linear servos

**Q:** Are Gobilda linear servos legal?

**A:** As long as a servo meets the constraints listed in RE10 it is allowed.

( Asked by **8899** answered Sep 22nd 23 )

## Q29 GoBilda Odometry Pods

**Q:** In past years, we have seen odometry kits banned. Are GoBilda's new odometry pods legal, or do we need to continue to build our own? <https://www.gobilda.com/odometry-pod-43mm-width-48mm-wheel-2048-ppr-encoder/>

**A:** Each new season brings a new set of Game Manuals and rules, it's never advised to make assumptions based on prior seasons. Rule RM02 this season includes a trio of exceptions, one of them allowing odometry kits.

( Asked by **14840** answered Sep 22nd 23 )

## Q30 Drone trajectory height / distance

**Q:** Rule Propelling Game Scoring Elements in GM1 states in part that scoring elements may only propel scoring elements with enough velocity to score and that Robots may not propel a scoring element in the air more than a 18 ft. (5.49 m) distance or more than 5 ft. (1.52 m) in elevation. Q1: Since the field + the scoring zone is 18' what is the penalty if the drone overshoots? Q2: How will the height be measured?

**A:** A1: The first instance of violating the \*Drone\* trajectory constraints during gameplay will not be penalized and the \*Drone\* is eligible to earn points for \*Parking In\* a \*Landing Zone\*. If a referee believes that the \*Drone\* exceeded the constraints described in rule RG07, the \*Drone\* must be reinspected before it can be used again in a \*Match\*. A2: A typical \*Drone\* trajectory testing area will be an open space next to a wall. Tape on the floor and wall will mark the distance and height constraints. The \*Robot\* will be positioned so that the \*Launched Drone's\* trajectory is along/parallel to the wall. The inspector will observe the \*Robot Launching\* the \*Drone\* several times to determine compliance with rule RG07.

( Asked by **9242** answered Sep 21st 23 )

## Q31 Are there any solutions/future plans to ensure metal field elements are grounded?

**Q:** The middle metal poles holding the truss, rigging, and stage door seem to have no way of electrically grounding themselves to outside of the field, so when metal on the robot touches these elements, there is a static discharge that cannot be avoided by teams. i) states robots cannot ground themselves to the playing field, and a grounding strap doesn't help. Will there be any rules that ensure competition fields are set up to remove static build-up on these poles?

**A:** This may come as a shock (pun intended), but grounding the field may have the opposite effect that you intend. By grounding certain elements of the field you virtually guarantee that ESD shocks will be more intense and more frequent, as there will almost always be a large difference in potential between any floating object sliding/moving on the field (robot, game pieces, etc...) and the grounded elements. Understand also that the common wisdom of "touching metal" also doesn't apply the same as it may have 5-6 years ago either - realize that virtually all aluminum extrusion on robots today is anodized, which is an electrically non-conducting coating on the extrusion. Older Tetrix anodized aluminum seems to have a thinner anodized layer, so it wears/scratches/rubs off more easily, and thus it was more likely that the aluminum would be electrically conductive and charge-accessible. This means you're not able to consistently rely on "metal" to "electrically connect" areas around the robot (i.e. thinking of the frame as a "wire" isn't as applicable). Also the grounding strap is not meant to "ground" your robot, it's meant to attempt to equalize the potential between your electronics and areas of static build-up on the robot that the strap is connected to so that when ESD does happen the charge potential is hopefully small and thus has little to no effect. The [Managing ESD]([https://ftc-docs.firstinspires.org/en/latest/hardware\\_and\\_software\\_configuration/configuring/managing\\_esd/managing-esd.html](https://ftc-docs.firstinspires.org/en/latest/hardware_and_software_configuration/configuring/managing_esd/managing-esd.html)) article on ftc-docs has several recommendations for how teams can protect their robots. No one solution is a silver bullet, though, careful attention is key! You've asked about what event organizers are doing to reduce ESD buildup on the fields. Heavy Duty Staticide is a staple for treating fields, especially those that are at high risk for static charge buildup like areas with extremely low humidity. This Heavy Duty Staticide has been proven to be extremely effective at significantly reducing (or eliminating) static charge buildup.

( Asked by **18362** answered Sep 24th 23 )

## Q32 What exactly is considered autonomous interference?

**Q:** Consider these scenarios: Q1: A robot places a pixel in the opposing alliance's half of the playing field and the pixel disrupts an opposing alliance's robot. Q2: A robot knocks over the pixel stacks on the opposing alliance's half of the playing field and their robot is no longer able to pick them up in autonomous. Q3: Are any of these scenarios considered interference as long as my bot doesn't touch their bot or interfere with the randomization task scoring?

**A:** A1: This scenario violates the \*Autonomous Interference\* rule, GS03. A2: Knocking over a \*Pixel\* stack in the opposing \*Alliance's\* half of the \*Playing Field\* that affects an opposing \*Alliance Robot\* during the \*Autonomous Period\*, violates rule GS03. A3: Yes, both of the scenarios in this question thread violate rule GS03, even though there is no direct \*Robot\* to \*Robot\* contact. \*\*Note\*\*: These are great questions that may lead to the Game Design Committee adding clarifying text to the \*Autonomous Period Interference\* rule, GS03, in a future release of the Game Manual Part 2. For now, per the text in section 4.5 of Game Manual Part 2, the answers in this question thread take precedence over all information in the game manuals.

( Asked by **17873** answered Sep 21st 23 )

### Q33 Notch in drone

**Q:** Are we allowed to cut a notch in the drone in order to attach a rubber band, spring or similar device?

**A:** There is no rule against cutting a notch in the Drone.

( Asked by **14840** answered Sep 21st 23 )

### Q34 Drone Folding Lines

**Q:** states that we may use a color printer to achieve the required red and blue colors. In the description, it also says "images." Are we also allowed to print folding lines to assist with the construction?

**A:** Yes, that is a legal image.

( Asked by **14840** answered Sep 21st 23 )

### Q35 Drone Placement in the Wing

**Q:** Q1: A human player can not be in the wing, if a robot is in the wing. Correct? Q2: If a drone is not pre-loaded on the robot before the match, it can be placed in the wing by the human player. Does the robot have to load the drone itself? I'm assuming that it could not be done by the human player.

**A:** A1: Yes, this is a correct statement. See rule GS12 to learn all of the \*Human Player\* constraints. A2: Yes, the \*Robot\* would need to load the \*Drone\* itself without human assistance per rule GS12.h.

( Asked by **4149** answered Sep 21st 23 )

### Q36 T265 camera legal this year?

**Q:** Will the Intel T265 Tracking Camera be legal this season 2023-2024? This camera model was legal in the past. A lot of teams purchased and spent a lot of time on them already.

**A:** No, the Intel T265 is not legal for use. The Intel T265 is a stereoscopic (having more than one image sensor) camera which would violate rule RE13.b.iii in Game Manual 1.

( Asked by **15167** answered Sep 23rd 23 )

### Q37 Will TGE (Team Prop) orientation be maintained during randomization?

**Q:** GM2 section 4.4.1(4)(c) says that field personnel will move the Randomization Object to the chosen Spike Mark. For teams using TGE (Team Props), will the field personnel attempt to maintain the orientation of the TGE as placed on the field by the Drive Team, or should teams anticipate that the TGE orientation will change as a result of randomization?

**A:** Yes, field personnel will strive to maintain the \*Team Prop's\* orientation when it is repositioned to a different \*Spike Mark\*. Randomization relocation is not a precision activity, \*Teams\* should design their \*Team Prop\* detection system to tolerate some change in orientation when it is relocated. The \*Drive Team\* should immediately alert field personnel if there is a significant change in the \*Team Prop's\* orientation. Using the referee question box after the \*Match\* ends to alert the Head Referee about a change in \*Team Prop\* orientation during randomization is too late to affect any \*Match\* outcome and it is not a justification to replay a \*Match\*.

( Asked by **7172** answered Sep 22nd 23 )

### Q38 Rigging suspension and robot weight

**Q:** Our team was discussing the rigging suspension task and thinking about years past about how there was a weight limit for suspending. Q1: Is there going to be an update to a weight limit? Q2: If not, what is the ruling if a pole bends or brakes due to robot weight?

**A:** A1: No, we feel that the \*Truss\* and \*Rigging\* will be able to withstand a "maximum" weight \*Robot\*. \*Robot\* weight was a major consideration when designing the \*Truss\* structure and writing the \*Truss\* constraints rule, GS06. A2: Rule S01 in Game Manual Part 2 describes the consequences for \*Playing Field\* damage. Some bending of the \*Rigging\* is expected while a \*Robot\* is \*Suspended\*. No \*Penalty\* will be administered if the \*Rigging\* returns to its nominal shape in time for the next \*Match\* on that \*Playing Field\*.

( Asked by **130** answered Sep 22nd 23 )

### Q39 do we have to make a paper airplane?

**Q:** A drone is defined as a "paper airplane" but it then says that it can be made out of any acceptable building material. Q1) do we have to make it out of paper? Q2) does it have to be in the shape of an airplane?

**A:** The rules for Drone construction are spelled out in Game Manual 1 Section 7.5 Q1: See Rule DR05 Q2: See Rule DR02

( Asked by **19591** answered Sep 23rd 23 )

### Q40 Follow up to q25 and Exceptions to RM02

**Q:** In q25, it was asked if a complete swerve drivetrain kit is a legal COTS drive chassis. The given answer was "A complete drivetrain made up of illegal parts is not legal." Follow up questions: 1) Which of the components in the proposed COTS kit are illegal parts? It would comprise entirely of motion components (bearings, shafts, gears) and structural components (mounts, frame, screws). 2) Is a complete swerve drivetrain kit compromising only of parts allowed under a legal COTS kit?

**A:** A swerve drive module, by its very design, takes a one degree of freedom (DOF) motion and adds additional degrees of freedom to change the motion - the total DOF is dependent on the implementation, but it is always more than one. These kinds of components are not allowed by RM02's single DOF restriction for COTS parts, whether bundled in a COTS drive chassis kit or not.

( Asked by **16379** answered Sep 24th 23 )

## Q41 Non-Ballistic Trajectory

**Q:** Q1: How will Robot Inspectors define non-ballistic trajectory (from )? Q2: From Q21: How will Referees define "near ballistic trajectory"?

**A:** A1: \*Robot\* Inspectors will evaluate compliance with rule DR02 by focusing on the \*Drone\* having the general configuration of an airplane with a defined fuselage and wings. A guide to assist \*Teams\* and \*Robot\* Inspectors with evaluating \*Drone\* designs will be published soon on the [Volunteer Resources] (<https://www.firstinspires.org/node/5146>) webpage. \*Robot\* Inspectors are not expected to validate the non-ballistic quality of \*Drone\* flight. When asked by a referee, a \*Robot\* Inspector will verify that the \*Drone's\* trajectory used in gameplay complies with rule RG07 in Game Manual Part 1. The typical setup for verifying rule RG07 compliance is described in the answer to !Q30. A2: Referees will focus on: a) Compliance with the \*Drone\* constraints rule GS10 and; b) \*Drone\* trajectory height and distance compliance with rule RG07. The ballistic characteristics of the \*Drone's\* trajectory is not a gameplay metric for the referee.

( Asked by **15259** answered Sep 26th 23 )

## Q42 Pixel moving which is on the floor and not used by alliance.

**Q:** Action 1. Red alliance robot picks up a pixel from their side of the field. Action 2. Moving it towards their backdrop/backstage, they drop the pixel outside a scoring area in the blue alliance side of field, while on the way. Q1: Can a blue alliance robot pickup the pixel and use it for their advantage? Q2: This is not autonomous interference? Q3: Does it incur any penalty?

**A:** A1: Yes. During the \*Autonomous Period\* it is a non-scored \*Pixel\* located in their \*Alliance's\* half of the \*Playing Field\*. During the \*Driver-Controlled Period\* it is available to a \*Robot\* on any \*Alliance\* because it is not \*In\* a \*Scoring Area\* or \*Wing\*, provided that no other rule is violated (for example, GS05 and GS08 to name a few). Keep in mind that during the \*Autonomous Period\*, \*Robots\* may only use its own \*Pre-Loaded Pixels\* to earn \*Randomization Task\* points per section 4.4.2 item 2.b in Game Manual Part 2. A2: The red \*Alliance\* violates rule GS03 each time the dropped \*Pixel\* disrupts a blue \*Alliance Robot\* during the \*Autonomous Period\* or if the red \*Alliance Robot\* directly \*Interferes\* with an opposing \*Alliance Robot\* that is in its own \*Alliance's\* half of the \*Playing Field\*. The blue \*Alliance Robots\* are not at risk for violating the \*Autonomous Interference\* rule, provided that they remain on their \*Alliance's\* half of the \*Playing Field\*. A3: See A2.

( Asked by **21816** answered Sep 23rd 23 )

## Q43 Drone in air when time is up

**Q:** A drone is launched during last couple seconds of the end game phase. Does the score count if the drone is launched right before the game finishes and lands after game time is up? We are talking about 2-3 seconds of margin where the drone might be launched and up in the air and time is up after the match.

**A:** Yes, the \*Drone\* is eligible to earn \*Landing Zone\* points per rule G20.b in Game Manual Part 2.

( Asked by **21816** answered Sep 23rd 23 )

## Q44 Backdrop scoring and restriction in Autonomous.

**Q:** Q1: Do both teams in an alliance get to have their own team prop on each side of the truss? Q2: May both teams on an alliance put pixels on the backdrop and score? That way we have two yellow pixels on the backdrop by end of autonomous. Q3: Is there any way an alliance can put more colored pixels on the backdrop during the autonomous period?

**A:** A1: Yes, see section 4.4.1 item 3.d in Game Manual Part 2 for how to place a \*Team Prop\* on the \*Playing Field\* during pre-\*Match\* set up. A2: Yes. A3: Each \*Drive Team\* may \*Pre-Load\* exactly one (1) yellow \*Pixel\* and one (1) purple \*Pixel\* during pre-\*Match\* set up as described in section 4.4.1 item 3.b in Game Manual Part 2. This is the only way non-white colored \*Pixels\* enter the \*Playing Field\* for use during the \*Autonomous Period\*. A highly unlikely, legal way for a \*Robot\* to access an additional non-white \*Pixel\* would be by picking up a stray non-white \*Pixel\* located \*In\* its \*Alliance's\* half of the \*Playing Field\*. Keep in mind that \*Robots\* may only use its own \*Pre-Loaded Pixels\* to earn \*Randomization Task\* points per section 4.4.2 item 2.b in Game Manual Part 2.

( Asked by **21816** answered Sep 23rd 23 )

## Q45 6.1 Eligibility for Advancement: Home Region

**Q:** Tennessee Valley Robotics sponsors a State Championship in Tennessee and Alabama. There are the only advancement competitions in Tennessee and Alabama. Can teams in the Tennessee Valley region compete in both the Tennessee and Alabama State Championship for advancement to World and the Inspire Award?

**A:** Per the eligibility for advancement criteria outlined in section 6.1 of the Game Manual Part 1, teams may only advance from events within their home region. Teams may still compete in events outside of their home region, but are not eligible for advancement. Teams competing outside of their home region are eligible to be judged for all awards except for the Inspire award. For all awards except Inspire, teams may be considered a finalist or winner of the award but are not eligible to advance. Teams are not eligible for consideration for the Inspire award, including 2nd and 3rd place Inspire spots, outside of their home region.

( Asked by **21457** answered Oct 3rd 23 )

## Q46 Interaction with the Pixel and Props on the spike mark during autonomous

**Q:** During the autonomous period while traveling to our Alliance's Backstage, is there a penalty or de-scoring if our robot bumps: Q1: Our purple Pixel off the randomly selected Spike Mark. Q2: Our prop off the randomly selected Spike Mark. Q3: Our alliance partner's purple Pixel off the randomly selected Spike Mark. Q4: Our alliance partner's prop off the randomly selected Spike Mark.

**A:** A \*Robot\* is allowed to descore a \*Pixel\* from its own \*Alliance's Scoring Area\*. The only consequence is the loss of \*Score\* value (points) for the descored \*Pixel\*. A1: No \*Penalty\* and the \*Purple Pixel\* does not earn points for the \*Spike Mark Randomization Task\* if it is \*Off\* the designated (correct) \*Spike Mark\* at the end of the \*Autonomous Period\*. A2: No \*Penalty\*. A3: No \*Penalty\* and the \*Purple Pixel\* does not earn points for the \*Spike Mark Randomization Task\* if it is \*Off\* the designated (correct) \*Spike Mark\* at the end of the \*Autonomous Period\*. A4: No \*Penalty\*.

( Asked by 21457 answered Sep 23rd 23 )

## Q47 Moving pixels from spike marks

**Q:** Q1: If the purple pixel is placed on the spike mark in the scoring position, but due to movement of robots doing other tasks, if it moves the pixel from the spike mark (alliance robot or opponent robot), how does the scoring work? Q2: If the achievement score is determined right after autonomous, in the driver-controlled period, can we use that spike mark pixel for badkrop/backstage scoring purpose?

**A:** A1: \*Autonomous Period\* tasks are \*Scored at Rest\* per section 4.4.2 in Game Manual Part 2. ""Scored at Rest"" is defined in section 4.3 in Game Manual Part 2. Applying the definition to the \*Pixel\* placed on the \*Spike Mark\*, the \*Pixel\* is considered to be \*Scored\* if it is \*On\* the designated (correct) \*Spike Mark\* when the entire field has come to rest after the \*Autonomous Period\* ends. In the Q1 scenario, the purple \*Pixel\* is not \*On\* the correct \*Spike Mark\*, therefore, the \*Pixel's Score\* value is zero. There is no \*Penalty\* if a \*Robot\* descores its own \*Alliance's Pixel\*. Rule GS03 is violated If an opposing \*Alliance Robot\* descores the \*Spike Mark Pixel\*. A2: Yes.

( Asked by 21816 answered Sep 23rd 23 )

## Q48 Moving pixels from spike marks

**Q:** Q1: If the purple pixel is placed on the spike mark in the scoring position, but due to movement of robots doing other tasks, if it moves the pixel from the spike mark (alliance robot or opponent robot), how does the scoring work? Q2: If the achievement score is determined right after autonomous, in the driver-controlled period, can we use that spike mark pixel for badkrop/backstage scoring purpose?

**A:** We believe !Q47 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by 21816 answered Sep 23rd 23 )

## Q49 Moving pixels from spike marks

**Q:** Q1: If the purple pixel is placed on the spike mark in the scoring position, but due to movement of robots doing other tasks, if it moves the pixel from the spike mark (alliance robot or opponent robot), how does the scoring work? Q2: If the achievement score is determined right after autonomous, in the driver-controlled period, can we use that spike mark pixel for badkrop/backstage scoring purpose?

**A:** We believe !Q47 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by 21816 answered Sep 23rd 23 )

## Q50 Followup Q13

**Q:** I am still not clear on Q13, as well as the how to apply rule GS05 in the game manual part 2. 1) GS05c. iii. - Plowing through any quantity of Scoring Elements is allowed. 2) GS05a. - Controlling or Possessing more than the allowed quantity of Scoring Elements is an immediate Minor Penalty. I am looking for one example where plowing a robot through 3/4/5 elements does not violate rule GS05a, or does not belong to herding. I am unable to understand the use of GS05.c.iii.

**A:** Before proceeding with reading the following information, please review the game-specific definitions of the terms \*Control\*, \*Possess\*, \*Herding\*, and \*Plowing\* in section 4.3 of Game Manual Part 2. Applying the common or dictionary definitions of any game-specific term in section 4.3 may result in a misunderstanding of a scoring achievement requirement, rule, procedure, etc. Game-specific terms are easy to identify in the Game Manual because they have italics formatting and the first letter is capitalized. For example, the text ""\*Control\*"" has the correct formatting for a game-specific term. We strive to use this same formatting for defined terms contained in answers to gameplay questions in this forum. Rule GS05.a limits the number of \*Pixels\* and \*Drones\* that a \*Robot\* can legally \*Control\* or \*Possess\*. This \*Team's\* question (!Q50) asks for an example of where \*Plowing\* through 3/4/5 \*Pixels\* does not violate rule GS05.a. The definition of \*Control\* specifically states that \*Plowing\* is not a form of \*Control\*. Therefore, all \*Plowing\* actions by a \*Robot\* do not violate the \*Scoring Element Control/Possession\* rule, GS05.a. The second part of this \*Team's\* question asks for a \*Plowing\* scenario that is not \*Herding\*. Since \*Plowing\* actions and \*Herding\* actions are mutually exclusive, all \*Plowing\* actions are not \*Herding\*. The following are gameplay examples that may be helpful: Example 1: A \*Robot\* collects two \*Pixels\* from a \*Pixel\* stack. Since these are the only \*Pixels Possessed\* or \*Controlled\* by the \*Robot\*, rule GS05.a is not violated. The \*Robot\* drives directly through the \*Truss\* or \*Stage Door\* and stops \*In\* their \*Alliance's Backstage\*. Along the way to the \*Backstage\*, a stray \*Pixel\* on the \*Playing Field Floor\* is pushed by the \*Robot\* and it winds up \*In\* the \*Backstage\*. The \*Robot\* has now violated rule GS05.a because it \*Possesses\* two \*Pixels\* and it \*Controlled\* (\*Herded\*) the stray \*Pixel\* for a total of three (3) \*Controlled Pixels\*. The stray \*Pixel\* was \*Herded\* because it was moved to a location that provided the \*Alliance\* a strategic advantage since it was \*Scored In\* the \*Backstage\*. Example 2: Same as Example 1, except when the \*Robot\* encounters the stray \*Pixel\*, it pushes the stray \*Pixel\* for a short distance. The \*Drive Team\* quickly realizes that the \*Robot\* just started to \*Control\* too many \*Pixels\*. The \*Drive Team\* changes the \*Robot's\* direction of travel so that the \*Robot\* sheds the stray \*Pixel\*, leaving it behind on the \*Playing Field Floor\* while the \*Robot\* continues on its way to the \*Backstage\*. In this example, the stray \*Pixel\* was \*Plowed\* (i.e. it was not moved into a location that gave the \*Alliance\* a strategic advantage). Therefore, rule GS05.a is not violated. If there is still uncertainty about how \*Controlling\*, \*Possessing\*, \*Herding\*, and \*Plowing\* apply to rule GS05, the Head Referee at your next competition will be happy to answer your questions during the \*Drivers Meeting\*. Demonstrating gameplay scenarios on a \*Playing Field\* is an excellent way to gain understanding of how to apply rules to complex scenarios. \*\*Pro Tip:\*\* \*Drive Teams\* have an obligation while driving their \*Robots\* around the \*Playing Field\* to avoid \*Controlling\* stray \*Pixels\* that would cause the \*Robot\* to violate rule GS05. In other words, \*Robots\* should maneuver around stray \*Pixels\* if their \*Herding\* would cause the \*Robot\* to exceed the allowed number of \*Controlled Pixels\*. \*\*Warning:\*\* Deliberately placing \*Pixels\* in locations on the \*Playing Field Floor\* to use rule GS05.a constraints as a strategy to increase the difficulty for an opposing \*Alliance Robot\* to move around the \*Playing Field\* violates rule G29.

( Asked by 21816 answered Sep 23rd 23 )

## Q51 Train Model Button Disabled

**Q:** I have followed all the steps in the Machine Learning Tutorial Tool Chain and whenever I generate a data set, if I try to train it the start training button does not become active. This is the same issue as described in Q17 but the response to that question does not solve the problem. I have already contacted customer support at FIRST a week ago with no resolution.

**A:** This is a technical support question, not a game-specific rules clarification. If the issue persists, please seek help on the [ftc-community](https://ftc-community.firstinspires.org/) forums. The FIRST Tech Challenge engineering staff is monitoring those forums, and await your questions.

( Asked by **21915** answered Sep 22nd 23 )

## Q52 Randomization Task Spike Mark Location Nomenclature

**Q:** Q1: For the autonomous randomization task, and placing the yellow pixel on the backdrop, what exactly is meant by “A yellow Pixel on the Backdrop in the location corresponding to the designated Spike Mark”? Is it that spike marks are inferred to be, facing the spike marks, left 1, top/middle 2, and right 3. Q2: Is it the same numbering for both red and blue alliance, in all positions?

**A:** A1: The answer that you seek is found by viewing illustrations E-3, E-4, and E-5 in Appendix E of Game Manual Part 2. A2: Yes.

( Asked by **22420** answered Sep 23rd 23 )

## Q53 Autonomous yellow pixel placement on the backdrop

**Q:** For the randomization in the autonomous period and placing the yellow pixel on the backdrop, it looks as if each location, 1, 2 & 3 all have 2 slots that the pixel can be placed in, or is it only the left most slot of that location?

**A:** The answer that you seek is found by viewing illustrations E-3, E-4, E-5, and E-6 in Appendix E of Game Manual Part 2. Each randomization task *\*Spike Mark\** location (left, center, and right) has two (2) slots on the *\*Backdrop\** that the *\*Pixel\** can be placed into.

( Asked by **22420** answered Sep 23rd 23 )

## Q54 Pixel Possession in Autonomous

**Q:** A robot has a spinning intake that can extend ~3 feet in front of the robot, and in the process of intaking a stack in the autonomous period, the robot intakes 3 pixels. However, after the intake retracts, the 3rd pixel spits out of the robot. Would this be counted as a pixel control/possession limit violation?

**A:** We believe !Q2 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by **23957** answered Sep 23rd 23 )

## Q56 Are optic flow sensors considered image sensors?

**Q:** Would a optic flow sensor considered as an image sensor as in the definition of the Vision Camera and Visions Sensor?

**A:** An optic flow sensor usually combines a camera, distance sensor (sonar or lidar are most common), and sometimes an IMU. This type of device uses these component sensors to make decisions and provides outputs that can be read/used by a control system - this is the very definition of a Vision Sensor as defined by Game Manual 1. Just be sure the device does not violate any Vision Sensor rules in RE13.b, and also ensure that none of the component sensors violate any rules such as RE12.c in the case of optic flow sensors containing lasers (such as lidar sensors).

( Asked by **19071** answered Sep 24th 23 )

## Q57 Manipulation of pixels after being scored

**Q:** According to Game Manual 2, specifically , it is stated that pixels scored on the backdrop are not subject to the control/possession limit. Does this imply that an alliance can freely manipulate any number of pixels on their backdrop even after they have been scored, as long as these pixels maintain contact with the backdrop?

**A:** Yes, provided that the *\*Robot\** is not *\*In Tile\** rows 1, 2, or 3 per rule GS08.d.

( Asked by **15342** answered Sep 24th 23 )

## Q58 Rule G05 clarification

**Q:** Robots or Scoring Elements that are eligible for two or more Scoring achievements earn points only for the highest value achievement. Q1: Is a Yellow Pixel placed On an Alliance’s designated Backdrop location eligible for both the 20 point randomization task and the 5 point placement task? Q2: Will the Yellow Pixel then earn 3 points at the end of the Driver-Controlled Period? Q3: Are there other scenarios where rule G05 would apply (except Drones In multiple Landing Zones and Navigating)?

**A:** A1: The short answer is Yes. The yellow *\*Pixel\** is in two *\*Scoring Areas\**, *\*On\** the *\*Backdrop\** and *\*In\** the *\*Backstage\**. Applying rule G05, the *\*Pixel's\** highest value achievement is for being *\*On\** the *\*Backdrop\**. During the *\*Autonomous Period\**, all *\*Pixels\** *\*On\** the *\*Backdrop\** earn five (5) points. The yellow *\*Pixel\** has an additional *\*Randomization Task\** scoring potential that is dependent upon its location *\*On\** the *\*Backdrop\** as described in section 4.4.2 item 2.b. The yellow *\*Pixel\** may earn both the standard five (5) points for being *\*On\** the *\*Backdrop\** and the *\*Randomization Task\** points for being in the location corresponding to the designated *\*Spike Mark\**. A2: Yes, if the yellow *\*Pixel\** is *\*On\** the *\*Backdrop\** at the end of the *\*Match\**. A3: For the CENTERSTAGE game, rule G05 applies to: a) *\*Pixels\** that are *\*On\** the *\*Backdrop\** and *\*In\** the *\*Backstage\**; b) *\*Robots\** that are *\*Suspended\** from the *\*Rigging\** and are *\*Parked In\** the *\*Backstage\**; and c) *\*Drones In\** two (2) *\*Landing Zones\**. Applying rule G05 to the *\*Navigation\** scoring achievement during the *\*Autonomous Period\** is not necessary because there is only one location based *\*Scoring Area\** for the *\*Robot\** during that *\*Match Period\**.

( Asked by **21028** answered Sep 24th 23 )

## Q59 Vision Camera Questions

**Q:** We are a rookie team so we want to know how many vision cameras are allowed to use this year (one other team told us that only one vision camera can be used). Also are Pixy or Pixy2 Cam allowed?

**A:** 1. Welcome to \*FIRST\* Tech Challenge! 2. There are no rules that specify a maximum quantity on sensors, Vision Cameras, or Vision Sensors. 3. The Pixy and Pixy2 are Vision Sensors, the Pixy2 is specifically called out as a common Vision Sensor in the definition of a Vision Sensor. Note that the Pixy and Pixy2 do not have native software support in SDK 9.0, so teams will need to develop their own software drivers to use them.

( Asked by **23280** answered Sep 24th 23 )

## Q60 Clarification on pixel stack penalties

**Q:** In the third part of Q13 and in c.ii of the game manual, it is mentioned that it is a penalty to move a stack of more than 2 white pixels off the line. My question is how many penalties would this violation cause? Would it cause multiple minor penalties for each pixel more than 2 on the stack, (Ex. 3 penalties for moving a stack of 5), or just one minor penalty for the entire stack moving?

**A:** Rule GS05.a is restated here with the answer to your question highlighted with bold formatting: "**Robots** may **Control** or **Possess** a maximum of two (2) **Pixels** and one (1) **Drone** at a time. **Controlling** or **Possessing** more than the allowed quantity of **Scoring Elements** is an immediate **Minor Penalty** **\*\*for each Scoring Element** above the limit**\*\*** plus an additional **Minor Penalty** per **Scoring Element** in excess of the limit for each 5-second interval that the situation continues." If the **Robot** does not **Control** any **Pixels** just before it moves the **Pixel** stack **Off** the white tape line, the number of **Minor Penalties** is the quantity of **Pixels** in the stack minus two (2). For example, if there are five (5) **Pixels** in the stack, the **Penalty** is three (3) **Minor Penalties** for **Controlling** three (3) **Pixels** above the allowed quantity of two (2). If the **Robot** continues to **Control** more than the allowed quantity of **Pixels**, an additional **Minor Penalty** for each **Pixel** over the allowed quantity of two (2) will be assessed every five (5) seconds that the **Robot** **Controls** more than two (2) **Pixels**.

( Asked by **19411** answered Sep 24th 23 )

## Q61 Penalty Point Values

**Q:** After text searches through GM1 and GM2, I have been unable to find point values for penalties in this year's game. What are the point values for minor and major penalties respectively?

**A:** The answer that you seek is found by reading the "**Penalties**" section 4.4.6 in Game Manual Part 2. Section 4.4.6 states in part: "**Minor Penalties** give the non-offending **Alliance** ten (10) points per occurrence. **Major Penalties** give the non-offending **Alliance** thirty (30) points per occurrence."

( Asked by **10836** answered Sep 24th 23 )

## Q62 Are solenoid actuators allowed if used as a servo?

**Q:** Our team is considering using a solenoid (6v) in lieu of a servo. Does this run afoul of regulations?

**A:** Solenoids are not allowed per RE16.

( Asked by **14903** answered Sep 25th 23 )

## Q63 How enclosed can the hexagons be in the robot?

**Q:** How enclosed can the pixels be in the robot? Meaning, do the refs have to see the pixels at all times or can they go into the robot?

**A:** Yes, Pixels can be in the robot. However, once inside the Robot it is to a team's advantage to keep the Pixels visible so that it is easy for the Ref to determine the quantity of Pixels that a Robot is carrying, but it is not a requirement.

( Asked by **12682** answered Sep 26th 23 )

## Q64 GS12 - Human player inadvertently and temporarily straying into wing/field

**Q:** Scenario: There is no robot in the wing. During the gameplay, the human player inadvertently leans her head over the vertical plane of the field perimeter, into the wing/field area, perhaps to enjoy the gameplay. Q1: Does the team incur an immediate penalty in this scenario? Q2: Human player realizes her action and backs her head out of the wing/field within X seconds. Does the team still incur a penalty in this scenario? Q3: If the answer to Q2 is no, what is the value of X?

**A:** A1: The **Human Player** should receive a **Warning** the first time they extend into the **Playing Field Perimeter** without demonstrating a clear intent to place a **Scoring Element** into the **Wing**. Subsequent extensions into the **Playing Field Perimeter** without the intent of placing **Scoring Elements** into the **Wing** should receive a **Minor Penalty** for each occurrence per rule GS12. A2: Same answer as A1. A3: Not applicable.

( Asked by **23312** answered Sep 26th 23 )

## Q65 GS11.g.i - Tall robots being hit by opposing alliance drone near the audience side wall

**Q:** Rule GS11>g.i states - "Affecting the flight of an opposing Alliances Drone above Playing Field Wall.... Opposing Alliance Drone receives points for Landing Zone 1." Scenario: A tall RED robot parks itself right along the audience side perimeter wall, during the game play. A BLUE drone hits it during end game and falls into the playing field instead of landing/falling into zone 1/2/3. RED team had no way of knowing the BLUE drone trajectory. Is this scenario a violation of g.i?

**A:** Yes, the red **Alliance Robot** in this scenario violates rule GS11.g.i. When a **Drone** contacts an opposing **Alliance Robot** that is actively playing the game in the front half (audience side) of the **Playing Field**, the referee may use their judgement to decide if it was allowed gameplay or if a rule GS11.g.i violation **Warning** or **Penalty** should be applied. In the scenario described in the question, the **Parked Robot** is not actively playing the game and is likely to be viewed by the referee as a strategy to interfere with a **Drone's** flightpath. The following are a few examples of active gameplay that are unlikely to be viewed as violating rule GS11.g.i if the **Robot** contacts an opposing **Alliance Drone**. a) A **Robot** driving from their **Alliance's Wing** along an approximate direct path through the **Truss** or **Stage Door** towards their **Backstage** area. b) A **Robot** returning from their **Backstage** area along an approximate direct path through the **Truss** or **Stage Door** towards their **Alliance's Wing**. c) A **Robot** preparing to **Suspend**. d) A **Suspended Robot**. Example scenarios where the referee is likely to issue a rule GS11.g.i **Warning** or **Penalty** are: e) A **Robot** moving around the front half (audience size) of the **Playing Field** without an obvious **Scoring Element** collection, transportation, or **Scoring** purpose. f) A **Robot Parked** in the front half (audience) side of the **Playing Field**. **\*\*Note:\*\*** **Robots** have an obligation during the

\*End Game\* to avoid gameplay strategies that interfere with an opposing \*Alliance Drone's\* trajectory. Similarly, a \*Robot Launching\* a \*Drone\* may not use rule GS11.g protections as a strategy to receive \*Landing Zone 1\* points.

( Asked by **23312** answered Sep 26th 23 )

## Q66 GS11.b - Inadvertent possession of another Team's Drone.

**Q:** Rule b - "A Robot may not Possess a Drone provided by another Team. A Major Penalty will be assessed for violating this rule." Scenario: A RED alliance drone is launched during the end game and lands inside/over a BLUE alliance robot. BLUE robot is unable to shake off the RED drone. Does the BLUE alliance incur a penalty for this inadvertent, and completely out of their control, possession of RED drone?

**A:** No \*Penalty\* should be assessed for this \*Inadvertent\* gameplay scenario. The inadvertently \*Possessed Drone\* does not count towards the \*Robot's\* one (1) \*Drone Control/Possession\* limit (GS05.a). The \*Robot\* may continue normal gameplay; trying to "shake off" the stray \*Drone\* is not required.

( Asked by **23312** answered Sep 27th 23 )

## Q67 V-Slot aluminum legal to use?

**Q:** Hi. Is it legal to use V-Slot Aluminum? There is a picture on page 16 of the "Legal/Illegal Parts" document that has V-Slot piece pictured however it is under the T-slot section. Thanks!

**A:** Yes, v-slot aluminum is a legal material.

( Asked by **21630** answered Sep 26th 23 )

## Q68 Is it legal to remove a Motor Mount to use on a robot?

**Q:** Is it legal to remove a motor mount from a Modern Robotics/MATRIX 12VDC Motor with 8mm REX™ Pinion Shaft (5000-0002-4008) to use on the robot?

**A:** Yes, it is legal to use a motor in which the motor mount/pinion shaft has been removed.

( Asked by **21630** answered Sep 27th 23 )

## Q69 Can we power sensors connected to the analog, digital, and i2c port from 5v aux port?

**Q:** Past interpretation of the prior version of RE11.a allowed for many 5v in, 3.3v out sensors to be connected to the aux 5v port. The new RE11.a seems to clarify where sensors can be connected, but was it intentional to outlaw use of the 5v aux port to power them even though they are otherwise connected to the analog, digital, and i2c ports for all but power? The aux port is used to power other sensor port devices, like I2C lights (see Q27)

**A:** No. Sensors may only be powered via the ports listed in RE11.a. If your sensor needs 5v, you will need to utilize the REV Logic Level Converter as described in RE11.b

( Asked by **14423** answered Sep 28th 23 )

## Q70 Drone Curved Glide Path

**Q:** Q1: The answer to Q30 may imply that only straight drone flights are permitted, what if a drone is meant to follow a curved glide path? Q2: Is it right to assume that the drone cannot exceed a 12' wide x 18' long x 5' high space flight space? Q3: If following a curved trajectory, may a drone leave the field space before returning to the Landing Zone?

**A:** A1: In general, a curved glide path is allowed. A2: The Game Manual does not specify a lateral (wide) trajectory constraint. The geometry of the gameplay area is the practical limitation for the \*Drone\* trajectory. The eighteen (18) ft. long and five (5) ft. high \*Drone\* trajectory limits described in rule RG07 will be enforced. A3: A \*Drone\* is allowed to exit the \*Playing Field\* in any direction. There are consequences if the \*Drone\* impacts something \*Outside\* the \*Playing Field Wall\* as described in rules GS11.g.iii, GS11.g.iv, GS11.g.v., and S1 if there is a safety hazard. \*\*Note 1:\*\* \*Drone\* trajectory strategies that exit the \*Playing Field Perimeter\* other than through the audience edge of the \*Playing Field Wall\* do so at their own risk. \*\*Note 2:\*\* A \*Drone\* impacting a \*Drive Team\* member of either \*Alliance\* in a manner that is not interference (i.e., the \*Drive Team\* member was not able to avoid being hit) should be treated as a \*Scoring Element\* out of bounds and returned to the owning \*Alliance's\* Pixel Storage\* at the earliest, safe opportunity.

( Asked by **15259** answered Sep 27th 23 )

## Q71 REV grounding strap wiring constraints?

**Q:** Reading RE14.k, it seems that the only legal connection points for a REV Grounding Strap are the female XT30 ports of a Control Hub, Expansion Hub, XT30 Power Distribution Block, or the female XT30 on a REV PowerPole to XT30 adapter. Q1: Is this an accurate conclusion? Q2: Does the "No other...adapters are permitted" portion of RE14.k also apply to electrical connections "upstream" (towards the Main Power Switch) of the CH/EH/PDB/PP component the grounding strap is connected to?

**A:** Answer 1: RE14k requires that the REV Grounding Strap be directly connected to a fully-COTS component with XT30 connectors (includes the REV provided XT30/Powerpole adapter). It may not be connected to team manufactured wiring. Answer 2: No. Teams are allowed to wire their robot as needed as long as the wiring does not violate any of the provisions of RE14.

( Asked by **7172** answered Sep 28th 23 )

## Q72 Specifications for a team prop

**Q:** What are the specifications for a team prop

**A:** Specifications for the Team Prop are listed in Game Manual 1, Section 7.4.

( Asked by **13532** answered Sep 28th 23 )

## Q73 RM06 and the Prop

**Q:** Is it correct to conclude that RM06 does not constrain (the design or construction of) the prop?

**A:** Yes, Rule RM06 applies to the Team Prop. Note that RM06 should be interpreted as pertaining only to the previous season's game elements (Power Play), not every game element from every FTC game.

( Asked by **18996** answered Oct 3rd 23 )

## Q74 DR05 Continuous piece

**Q:** Would a single, continuous A4 piece of paper, that has a 1" long cut in the center of the paper, such that the paper maintains the same surface area, and remains one piece with continuous edges, meet the requirements of ?

**A:** Yes, that satisfies the single sheet requirement.

( Asked by **18996** answered Oct 3rd 23 )

## Q75 Servo legality

**Q:** Is this servo legal, <https://a.co/d/cFk2HOy>? If not, are there any legal servos that have 50-70 kg per centimeter with 270 degree rotation?

**A:** In general, it is not possible for us to rule on the legality of every possible servo. As long as the servo meets the criteria in RE10 it is legal. We thought it important to add a few cautions for teams exploring large servos: - watch your total power budget. the main robot battery is fused at 20A - the servo power module is over-current limited at 15A - pay attention to the stall current. the above servo has a 8.5A stall current - a significant percentage of total robot power and of servo power module capacity - plan for variances in the stated stall currents for servos - a plus/minus 10% variance is likely - sustained high-current draw can cause the battery to "brown out", with the voltage dropping. large drops can cause loss of connectivity and reboots of control/expansion hubs

( Asked by **21630** answered Oct 2nd 23 )

## Q76 Points when splitting landing zone for Drone landing.

**Q:** When the Drone lands on a zone line between zones how are points counted? Say if the Drone lands on the zone line separating Zones 1 & 2 and 2 & 3.

**A:** The answer that you seek is found by reading rule G05 in Game Manual Part 2. Also, *\*Drone Landing Zone Scoring\** example B1 in Appendix F, illustration F-5, shows how a *\*Drone Parked\** in two *\*Landing Zones\** is *\*Scored\**. Rule G05 states: "*\*Robots\** or *\*Scoring Elements\** that are eligible for two or more *\*Scoring\** achievements earn points only for the highest value achievement. If the achievement values are equal, only one achievement counts as *\*Scored\**." Applying rule G05 to the two scenarios in the question: A *\*Drone Parked\** in both Landing Zones 1 & 2\* earns 30 points for *\*Landing Zone 1\**. A *\*Drone Parked\** in both Landing Zones 2 & 3\* earns 20 points for *\*Landing Zone 2\**.

( Asked by **19934** answered Sep 29th 23 )

## Q77 Can a Team Prop have retroreflective tape as part of its construction?

**Q:** TE02 specifies the Team Prop must be Red or Blue. TE03 disallows fiducial markers. Can a Team Prop incorporate red- or blue-colored retroreflective tape in its construction, or does that count as a fiducial marker?

**A:** Per Rule TE03, a Team Prop may not have any retroreflective materials.

( Asked by **10723** answered Oct 5th 23 )

## Q78 Clarification Q18 Robot Suspension in End Game

**Q:** Q18, A1 specified that after the 0:00 buzzer, the suspended robots may descend from the rigging without losing the bonus points. The flowchart in Section 4.4.7 of GM2 indicates that pressing stop on the Driver Station is the last action in Driver-Controlled Period. Pressing stop on the robot should depower motors used for hanging which will allow some robots to descend unpowered. Does such unpowered movement negate the 'at rest' condition for scoring purposes?

**A:** The answer that you seek is found by reading the description of the Robot location tasks in Game Manual Part 2 section 4.4.4 End Game. Per section 4.4.4 in Game Manual Part 2, the *\*Robot\** location (*\*Suspended\** and *\*Parked\**) *\*End Game Scoring\** achievements are *\*Scored at the End of the Period\**. *\*Scored at the End of the Period\** is defined in section 4.3 of Game Manual Part 2 as: "The achievement's *\*Scoring\** status is determined based on the *\*Robot\** or *\*Scoring Element's\** position at the *\*End of the Period\** (*\*Autonomous\** or *\*Driver-Controlled\**)". The *\*End of the Period\** for the *\*Driver-Controlled Period\** occurs when the scoring system *\*Match\** timer reaches zero seconds (0:00) remaining in the *\*Match\**. The condition "at rest" is intentionally omitted from the definition of *\*End of Period Scoring\**. The Game Design Committee (GDC) selected *\*End of Period Scoring\** for the *\*End Game Robot\** location *\*Scoring\** achievements for the reason stated in the question. After the required action of pressing the stop button on the *\*Driver Station\**, *\*Robots\** without a mechanical lock to maintain their position, are likely to lower to the *\*Playing Field Floor\**. The GDC wants *\*Suspended Robots\** at the *\*End of the Period\** to earn the *\*Suspended from the Rigging\** points, even if the *\*Robot\** lowers and touches the *\*Playing Field Floor\** after the *\*Match\** ends and the *\*Driver Station\** stop button is pressed.

( Asked by **21490** answered Sep 29th 23 )

## Q79 Solo cups as Team Prop

**Q:** Are Solo, or other disposable cups allowed to be used as team props this year. In Game Manual 1, Section 7.4. there is no mention of not using Solo or other cups. I recall last year they were not allowed due to many teams using them in Freight Frenzy. Additionally, Current Season Game and Scoring Elements does not disallow them either

**A:** Drinking cups in general are allowed providing they meet all the other Team Prop requirements, specifically size and uniform color. Many cups have a solid exterior color but are white inside. To be used in a Match, the cup would have to be oriented such that no white is visible, i.e. open side down. The cup would have to be inspected in the same orientation it will be used on the field.

( Asked by **20077** answered Oct 5th 23 )

## Q80 DR05a - are specialty papers allowed as long as they are sold as printer paper?

**Q:** Are specialty papers like those made with Tyvek allowed for drone construction as long as they are 20lb weight or lower and not "coated"? (Example: <https://www.jampaper.com/white-14lb-tyvek-8-1-2x11-paper-item-2179214491>).

**A:** No, specialty papers such as Tyvek are not allowed.

( Asked by **16461** answered Oct 3rd 23 )

## Q82 Are rubber bands legal for shooting the drone?

**Q:** Are rubber bands legal?

**A:** Yes, rubber bands are a legal part of the Robot. They are not a legal part of the Drone, so when shooting the Drone, the rubber band must remain attached to the Robot.

( Asked by **13246** answered Oct 2nd 23 )

## Q83 Will the OpenMV Cam RT1062 be allowed?

**Q:** We were wondering if the OpenMV Cam RT1062 qualifies as a Vision Sensor since you can upload your own code to it, but it doesn't stream images to the control hub if you use it with I2C, however, if you connect it with USB it can. (Section 7.2.1 Game Manual 1) So is it allowed to be used?

**A:** No. This is a user programmable microcontroller board and as such falls into the category of "Additional Electronics disallowed by RE16.

( Asked by **19444** answered Oct 2nd 23 )

## Q84 Which previous seasons are disallowed by part b?

**Q:** b. says "The following season game and scoring elements are not allowed for Robot construction: ... Team manufactured replicas of COTS current or previous season's scoring elements." Is the intended meaning of "previous season's scoring elements" to be "scoring elements of previous season" i.e. prohibiting just POWERPLAY replicas, or (if we reposition the apostrophe) "previous seasons' scoring elements" as in "scoring elements of [ALL] previous seasons"?

**A:** Rule RM06 should be interpreted as referring to only the previous season's game and scoring elements, which for Centerstage means any of the Power Play game and scoring elements.

( Asked by **10723** answered Oct 5th 23 )

## Q85 Are ethernet cables allowed for cable management?

**Q:** We have some questions about using an (coiled) CAT 6 ethernet cable to power multiple servos, so we don't need cable extensions, since it is within spec of CAT 6. Could you please clarify if this is allowed, and if so, under what circumstances: a) Is it allowed to cut the ethernet cable and solder servo mounts to it? b) Can we use a keystone, so you don't need to cut the cable? c) Create a custom PCB connecting an RJ45 connector to multiple servo connectors? (With appropriate insulation)

**A:** In general, bundled cables could be legal, as long as the individual wires within the bundle meet the requirements of RE14.i as applied to the specific connection being extended. Be aware that typical CAT6 cables use 23 AWG, thinner than the minimum required for servo interconnections (22 AWG). If you do end up utilizing bundled cables, be prepared to show documentation for the specifications of bundle and the specific circuits/interconnections made through the bundle. For your other questions: \* a) attaching connectors to allowed wiring is permitted per RE14.e \* b) keystone connectors fall under RE14.e as well \* c) no. a PCB would be an example of a custom circuit and disallowed per RE16

( Asked by **19444** answered Oct 4th 23 )

## Q86 Placing Pixels On either Backdrop

**Q:** Q1: Provided no rules are violated, during the Driver-Controlled period may a robot place Pixels On either Alliance's Backdrop during gameplay? Q2: For example, during Driver-Controlled, may a Robot on the Blue Alliance places a Pixel On the Red Alliance's Backdrop?

**A:** A1: No, placing a \*Pixel On\* the opposing \*Alliance's Backdrop\* violates rule G29 for amplifying the difficulty of creating a \*Mosaic\*. A2: No, per A1. \*\*Note:\*\* The \*Drive Team\* needs to be careful not to violate rules G28 (\*Pinning\*, \*Trapping\*, and \*Blocking\*), GS04 (descoring), and GS08 (\*Backdrop\* and \*Backstage\* constraints) while their \*Robot\* is near the opposing \*Alliance's Backdrop\* and \*Backstage\*.

( Asked by **8672** answered Oct 4th 23 )

## Q87 Field "April Tags"

**Q:** When we printed off the field "April Tags" at 100% on our printer, they did not measure 2" and 5" square, respectively. So we printed them off at 106%, and the sizes were correct, but the right (Tag ID: 10) and left (Tag ID: 7) dashed edges of the graphics were cut off. Does this matter?

**A:** Good job verifying the AprilTag size! All printers print differently, so this is a great pointer to all teams to verify the printed area for your printer. The dotted lines themselves are not critical to the detection of the AprilTags, they're there mostly as an indicator of the recommended whitespace around the tag. In our testing as long as there is still at least 50% of the whitespace remaining on the truncated side of the black square of the AprilTag body (compare the whitespace on the truncated side with the other sides) there should be no problem.

( Asked by **12168** answered Oct 3rd 23 )

## Q88 Indirect Penalties

**Q:** Rule G03 only mentions the case where an alliance forces another alliance to break a rule, but does not receive a penalty. Q1: What happens, for example, if a RED robot pushes/bumps a BLUE robot into the BLUE Backdrop, causing pixels to be descored? Does the RED robot receive penalties as if it were the one to directly descore the pixels? Q2: If the answer to Q1 is that the RED robot will receive penalties, how will it be determined if the RED robot's actions are enough to warrant a penalty?

**A:** A1: Yes, the red *\*Alliance\** will receive one *\*Minor Penalty\** for each affected *\*Pixel\**, completed *\*Mosaic\**, and *\*Set Bonus\**. For example, descoring two *\*Pixels\** that are part of a completed *\*Mosaic\** and a *\*Set Bonus\** achievement. Receive four *\*Minor Penalties\** as described below: a) Two (2) descored *\*Pixels\** = Two (2) *\*Minor Penalties\**. b) Two (2) *\*Pixels\** from the same *\*Mosaic\** = One (1) *\*Minor Penalty\**. c) One (1) or two (2) *\*Pixels\** eliminating one (1) *\*Set Line\** achievement = One (1) *\*Minor Penalty\**. A2: Any direct *\*Robot\** contact initiated by the red *\*Alliance Robot\** should be penalized if *\*Pixels\** are descored. Maneuvering close to an opposing *\*Alliance Robot\** that is close to their *\*Alliance's Backdrop\** and/or *\*Backstage\** is a risky gameplay strategy that does not have an obvious strategic gameplay advantage other than to disrupt the opposing *\*Alliance Robot\**. In the scenario described in the question, the referee should penalize the red *\*Alliance Robot\** for violating the descoring rule GS04.

( Asked by **16232** answered Oct 4th 23 )

## Q89 Grappling Hook

**Q:** Does the interpretation of include grappling hooks? In other words if a hook mechanism is attached to the Rigging, then released from the robot so that it is only held by aircraft cable and then that cable is winched back in order to lift the robot, is this allowed?

**A:** A mechanism that operates as described is legal. Note that launching the hook is not legal.

( Asked by **15259** answered Oct 3rd 23 )

## Q90 What is the exact definition of "preloaded" pixels for autonomous?

**Q:** Can we place the purple pixel for randomization task on the field mat and push it to the spike mark, or the pixel has to be loaded onto the robot?

**A:** The answer that you seek is found by reading section 4.4.1 item 3.b and the definition of *\*Pre-Load\** in section 4.3 of the Game Manual Part 2. Yes, the *\*Drive Team\** may set up their *\*Robot\** on the *\*Playing Field\** with their allowed *\*Pre-Load\** purple *\*Pixel\** on the *\*Playing Field Floor\** provided that the *\*Pixel\** is touching their *\*Robot\**.

( Asked by **23226** answered Oct 3rd 23 )

## Q91 Robot pushes team prop away from the spike mark

**Q:** Will there be a penalty if a robot pushes their alliance's team prop away from the spike mark during the autonomous or driver-controlled period?

**A:** No.

( Asked by **23226** answered Oct 3rd 23 )

## Q92 Placement of Team Prop on the spike mark by field personnel

**Q:** Will the field personnel always try to place the team prop in the middle of the selected spike mark segment during randomization?

**A:** Yes. **\*\*Note:\*\*** Randomization relocation is not a precision activity, *\*Teams\** should design their *\*Team Prop\** detection system to tolerate some variation in placement location and/or orientation when it is relocated by field personnel to a different *\*Spike Mark\**. The *\*Drive Team\** should immediately alert field personnel if there is a significant issue with the *\*Team Prop's\** centered location and/or orientation. Using the referee question box after the *\*Match\** ends to alert the Head Referee about a significant issue with *\*Team Prop\** location and/or orientation during randomization is too late to affect any *\*Match\** outcome and it is not a justification to replay a *\*Match\**.

( Asked by **23226** answered Oct 3rd 23 )

## Q93 Robot Weight

**Q:** What is the max that a robot may weigh this year. I believe in the past it was 40 lbs.

**A:** There is no weight restriction this year. See Q38 for additional details.

( Asked by **8136** answered Oct 3rd 23 )

## Q94 Clarification of rule GS06--Robot stabilization using height-restricting yellow bars

**Q:** According to rule GS06 in section 4.5.3 of GM2, "Contact with the other parts of the Truss is allowed for stabilization of the Robot while Suspended." Does this rule allow the robot to stabilize itself off of the height-restricting yellow bars below the Rigging?

**A:** Yes, provided that the *\*Rigging\** (blue or red pipe) provides the primary support for the *\*Robot\** per rule GS06.a.

( Asked by **11794** answered Oct 5th 23 )

## Q95 Grappling Hook - Clarification

**Q:** This is an clarification on Q89. Which of the following would be considered launching the hook? a) The hook is propelled from the robot attached with fishing line. b) The hook is propelled from the robot attached with aircraft cable. c) The hook is propelled from the robot attached with #25 chain (a safety hazard, yes, but a great hypothetical as we reduce degrees of freedom) d) The hook is propelled from the robot attached to a spring-loaded linear slide.

**A:** Placing a hook onto the Rigging by a mechanism (arm, slider, etc.) and then winching on a cable to lift the Robot is allowed. Launching the hook where it travels independent of the Robot is illegal per Rule RG06, regardless of what the connecting cable is made of, and will receive a G24 penalty (major plus yellow card). A1: illegal A2: illegal A3: illegal A4: As long as the hook remains attached to the slide until it is placed on the Rigging, then this mechanism is allowed.

( Asked by **15259** answered Oct 5th 23 )

## Q96 Gobilda linear slide legality

**Q:** Is the GoBilda Steel Viper-Slide (<https://tinyurl.com/5bdx8rpb>) a legal COTS part under RM02?

**A:** Per RM02, linear slides are a legal COTS. Therefore, the Gobilda Linear Slide is a legal COTs part.

( Asked by **20326** answered Oct 5th 23 )

## Q97 Drone launch before end game

**Q:** If for some reason our drone was launched accidentally before the end game starts, do we get a penalty?

**A:** There is no *\*Penalty\** for *\*Launching\** a *\*Drone\** before the start of the *\*End Game\**. The *\*Drone\** is not eligible to earn *\*Landing Zone\** points per section 4.4.4 in Game Manual Part 2 because it was *\*Launched\** before the start of the *\*End Game\**. If the *\*Drone\** is accessible *\*Inside\** the *\*Playing Field Boundary\**, the *\*Robot\** may try another *\*Drone Scoring\** attempt per rule GS11.e.

( Asked by **23226** answered Oct 5th 23 )

## Q98 Using Motorola phone as a camera sensor with a Control Hub

**Q:** Are we allowed to use a Motorola phone as a camera sensor connected to a Rev Robotics Control Hub in order to have a video processing stream as opposed to a frame by frame processing stream. We do not want to use the FTC app on the phone as a secondary control hub.

**A:** The short answer is no. This type of phone usage would need to fit into either a Vision Sensor model or a Vision Camera model. RE11.a requires that sensors (including vision sensors) be connected only to I2C, digital I/O, encoder, or analog ports of the REV control or expansion hubs. A USB port is not a valid connection for a sensor. The usage is therefore not a Vision Sensor usage RE16 disallows additional electronics. Using a phone in the above described fashion is creating a user-programmable device and falls under the guidance of RE16. Vision Cameras cannot be user-programmable devices.

( Asked by **24346** answered Oct 10th 23 )

## Q99 Follow up to answer to Q88 (descoring pixels)

**Q:** The answer to Q88 says that "...descoring two Pixels that are part of a completed Mosaic and a Set Bonus achievement. Receive four Minor Penalties as described below". What is the rule basis for the answer? says "A Minor Penalty will be assessed for each Pixel that is descored.", which in the given example is only 2 pixels. I see no rule that gives penalties for descoring a mosaic or a set bonus.

**A:** Descoring is a change of state of a *\*Scoring Element\** that reduces an *\*Alliance's\** total *\*Score\**. Removing or repositioning a *\*Pixel On\** the opposing *\*Alliance's\** Backstage\* has three potential descoring impacts on the *\*Score\** (*\*On\** the *\*Backdrop\**, *\*Mosaic\**, and *\*Set Line Bonus\**). Per !Q88, a *\*Minor Penalty\** is assessed for each descoring impact on the *\*Score\**. **Note:** Applying separate *\*Minor Penalties\** for each affected *\*Scoring\** achievement properly compensates the *\*Alliance\** for the descoring impact on their total *\*Score\**.

( Asked by **10723** answered Oct 6th 23 )

## Q100 Is this a legal drone?

**Q:** Is this a legal drone design (assuming it was the correct team color had a team number on it)? It follows a non-ballistic trajectory and has a fuselage and 4 wings (). Pictures: <https://docs.google.com/document/d/1vxjkC7jRas4xYdUXCO9SUta7wY9F9WxlcpdZV3v545g/edit?usp=sharing>

**A:** No, this is not legal for several reasons. It does not look like a "paper airplane", it does not follow a glide path, and it has 4 fins not wings.

( Asked by **6955** answered Oct 11th 23 )

## Q101 Clarification for Scoring on Backdrop

**Q:** According to S02, intentional robot extension outside the playing field perimeter is prohibited and will earn a yellow card if contact is made with any object. Wouldn't this mean robots are not intentionally allowed to extend above the upper half of the backdrop (which is located outside the field perimeter) even to score, and risk earning a yellow card? Given that propelling pixels is illegal (GS10), wouldn't that make scoring on the upper half of the backdrop essentially impossible?

**A:** Yes, *\*Robot\** access to the entire *\*Backdrop\** is necessary to fully play the game. When applying rule S02, the *\*Playing Field Perimeter\** is extend outward to include the *\*Backdrop\** boundary.

( Asked by **7462** answered Oct 10th 23 )

## Q102 Legality of modifying COTS Circuits

**Q:** As per Game Manual Part I, "Commercial Off the Shelf (COTS) interface modules designed to solely control light sources are allowed between the light sources and the components listed in d" Our team wishes to modify a REV Digital LED Indicator to change the color of the LED diodes as to avoid creating a "custom circuit" (RE16). As this is not listed as either an allowed or disallowed modification in RE15, are we allowed to do this, if the replacement diode is of a similar spec?

**A:** This type of modification is not allowed. This would constitute an internal modification of the circuits in the LED indicator and is not allowed per RE15

( Asked by **542** answered Oct 10th 23 )

## Q103 Can a robot go to other side of the truss in autonomous?

**Q:** I don't know if we heard this improperly, but at a Kickoff event, we heard that robots cannot travel to the other side of the trusses during autonomous. Is this true?

**A:** \*Robots\* are allowed to travel through the \*Truss\* and/or \*Stage Door\* during the \*Autonomous\* and \*Driver Controlled Periods\*.

( Asked by **12682** answered Oct 10th 23 )

## Q104 Wing penalty during autonomous period

**Q:** GS09 gives major (plus minor) penalties for robots moving in the opposing alliance Wing. However, the wing has no function until driver controlled period and it is in the interference-free half of the field. The robot in the starting location near the wing has very limited spaces to maneuver during autonomous. Should penalties be given for this during autonomous when there is no negative impact to the opposing team (assuming out by end of period)?

**A:** Rule GS09 applies to all periods of gameplay. However, a limited, brief, and \*Inconsequential\* entry into the opposing \*Alliance's Wing\* during the \*Autonomous Period\* is likely to be excused by the referee per rule G10.

( Asked by **19876** answered Oct 10th 23 )

## Q105 Intel T265 request

**Q:** My team and many others have spent a lot of effort creating software based on Intel T265, not to mention the cost of acquiring it. Please note that although T265 is stereoscopic, it is not used for vision at all. Teams use the estimated position it provides that is calculated by its internal algorithms that combine its camera views and its IMU. In our view it is essentially an alternate for dead wheel odometry. We graciously request it be allowed as in previous years.

**A:** Game Manual Part I is the definitive answer as to the allowed use of cameras, either as Vision Cameras or as Vision Sensors. Both usages are limited to a single image sensor. Vision Cameras are additionally limited to provide image/video streams only. As such, the Intel T265 camera is not legal for use as it fails the image sensor limitation and provides other than just image/video stream data.

( Asked by **4327** answered Oct 18th 23 )

## Q106 Intel T265 request

**Q:** My team and many others have spent a lot of effort creating software based on Intel T265, not to mention the cost of acquiring it. Please note that although T265 is stereoscopic, it is not used for vision at all. Teams use the estimated position it provides which it calculates using its internal algorithms that combine its camera views and its IMU. In our view it is essentially an alternate for dead wheel odometry. We graciously request it be allowed as in previous years.

**A:** Game Manual Part I is the definitive answer as to the allowed use of cameras, either as Vision Cameras or as Vision Sensors. Both usages are limited to a single image sensor. Vision Cameras are additionally limited to provide image/video streams only. As such, the Intel T265 camera is not legal for use as it fails the image sensor limitation and provides other than just image/video stream data.

( Asked by **4327** answered Oct 18th 23 )

## Q107 Pixel stack stabilization

**Q:** The answer to Q20 notes it is legal to intake pixels (from a stack) while the robot is touching other pixels on a stack, provided the robot does not already control any other pixels. We seek clarification that bracing the pixel stack against say the field wall, while extracting a pixel from that stack, does not constitute herding (and thus control), since the manual defines as pushing one/more scoring elements to a desired...direction.

**A:** We believe !Q24 answers your question. If it does not, please rephrase your question and resubmit. Bracing the \*Pixel Stack\* against the \*Playing Field Wall\*, while extracting a \*Pixel\* from that stack, does not constitute \*Control\* of the \*Pixel Stack\*.

( Asked by **11794** answered Oct 11th 23 )

## Q108 Is there a penalty for moving your prop off of the spike mark during autonomous?

**Q:** Is there a penalty for moving your team prop off of the spike mark during autonomous?

**A:** We believe !Q91 answers your question. If it does not, please rephrase your question and resubmit. During the \*Autonomous Period\*, \*Robots\* are allowed to move their \*Alliance's Team Prop\* off of the \*Spike Mark\*.

( Asked by **14493** answered Oct 11th 23 )

## Q109 Pixel Stack Movement During Autonomous Period

**Q:** Q1: If a robot during the autonomous period rams the wall in a way that knocks over multiple pixel stacks (on both red and blue sides of the field). Would this be deemed a violation of GS03? Q2: If a robot did this same action but only was able to knock over its own three stacks on its side of the field, would this be disallowed?

**A:** A1: For this *\*Autonomous Period\** gameplay scenario, the consequences are dependent upon the location of the knocked over *\*Pixel Stack\** as described below: *\*Alliance's\** half of the *\*Playing Field\**: There are no rule GS03 consequences. *\*Robots\** are allowed to knock over *\*Pixel Stacks\** on their *\*Alliance's\** side of the *\*Playing Field\**, provided that all of the *\*Pixels\** remain on the owning *\*Alliance's\** half of the *\*Playing Field\**. *\*Pixels\** relocated to the opposing *\*Alliance's\** half of the *\*Playing Field\** are treated as described below if the *\*Pixels\** impact an opposing *\*Alliance's Robot\**. Opposing *\*Alliance's\** half of the *\*Playing Field\**: Rule GS03.c is violated if knocking over or moving the *\*Pixels\** impacts or impedes the opposing *\*Alliance's Autonomous Period Scoring\** actions. Per rule GS03.c, a *\*Major Penalty\** will be applied for each impacted *\*Scoring\** action by an opposing *\*Alliance Robot\**. There are many possible opposing *\*Alliance Robot Scoring\** actions that are protected by rule GS03.c. One example scenario is a *\*Major Penalty\** is assessed for each cycle of an opposing *\*Alliance Robot\**: a) driving up to a pre-set *\*Pixel Stack\** location (i.e. on the white tape adjacent to the *\*Playing Field Wall\**) to pick up a *\*Pixel\**, and then b) moving away to continue playing the game. A2: See A1. **\*\*Warning:\*\*** The referee will likely have a conversation with the *\*Drive Team\** about this gameplay scenario. *\*Robot\** impact with the *\*Playing Field Wall\** that knocks over a *\*Pixel Stack\** is likely to be viewed as violating rule S01 for unsafe *\*Robot\** operation.

( Asked by 14525 answered Oct 12th 23 )

## Q110 Can Team number on Team Prop be printed on white background?

**Q:** Game Manual 1 says Team Prop has to be of solid color of red or blue, except for Team number. So is it ok we print team number on a piece of white paper then stick it onto the team prop?

**A:** No, the only non-alliance color on the Team Prop can be the numbers themselves.

( Asked by 23226 answered Oct 12th 23 )

## Q111 Communication between Human Player and Drive Team

**Q:** My drive team is finding it near impossible to view the pixel(s) during intake from the wing (due to large opaque robot size). Is it legal for the human player to communicate with the drive team via: a) short verbal commands (forward, backward, intake, outtake, etc.), b) hand signs (raised finger(s), open palm, closed fist, etc.), c) small colored flags/paper tokens?

**A:** The *\*Human Player\** actions described in a), b) and c) are all allowed provided that the *\*Human Player\** does not: 1) Distract an opposing *\*Alliance Drive Team\** per rule G16.c. 2) Reach *\*Into\** the *\*Playing Field\** per rule GS12.h. 3) Use electronics of any type per rule G11. 4) Dropping or placing signaling aids into the *\*Playing Field\** are subject to rule G22.

( Asked by 23312 answered Oct 17th 23 )

## Q112 Knocking pixels off the stack scenarios

**Q:** Clarification about knocking pixels off the stack. Q1: Autonomous - Is there a penalty if a robot knock pixels off own Alliance's stack while picking them, as long as the knocked-over pixels do not interfere with the opposing Alliance robot. Q2: Driver Control Period - Is there a penalty for ramming into own or opposing Alliance's pixel stack (to knock them over) and then picking up 2 pixels.

**A:** A1: No *\*Penalty\** per rule GS05.c.i. A rule GS03.c *\*Penalty\** does not apply because the scenario description stated that the knocked over *\*Pixels\** do not interfere with an opposing *\*Alliance Robot\**. A2: No *\*Penalty\** per rule GS05.c.i., provided that no other rules are violated. For example, *\*Pixels\** may not be *\*Propelled\** per rule GS10. **\*\*Note:\*\*** All *\*Pixel\** stacks are *\*Alliance Neutral\** during the *\*Driver-Controlled Period\**.

( Asked by 20373 answered Oct 16th 23 )

## Q113 Ranking Calculations

**Q:** How calculate the ranking of teams in the competition? is it the same of previous season? (By how many matches did the team win or by points?)

**A:** The answer you seek is located in section 5.0 of Game Manual Part 1 - both Traditional and Remote.

( Asked by 21417 answered Oct 18th 23 )

## Q114 Eligibility for Advancement

**Q:** If there is a team competing in a region other than its home region, it cannot qualify for the World Championship, but if a team from the home region allies with it and they win the final match, does this qualify it to qualify for the World Championship instead?

**A:** If a team is part of the winning alliance at an event outside of their home region, this does not qualify the team for advancement. The advancement spots available would skip over the out of home region team to the next eligible advancing team within the home region.

( Asked by 21417 answered Oct 18th 23 )

## Q115 Can the Drone have print on it?

**Q:** Are you able to have printing on the drone? If it is unseen?

**A:** Yes, printing is allowed provided rule DR05 b is satisfied, no other rules are violated and the printing is not offensive. Note that the rules for the Team Scoring Element (Drone) are different than the rules for the Team Game Element (Team Prop). The Drone only needs to be predominantly red or blue and may have images, symbols, lettering, on it. The reason for the rule requiring predominantly red or blue is so that Field Personnel can easily determine which alliance earns points.

( Asked by **20022** answered Oct 17th 23 )

## Q116 Parking in the backstage at the end of autonomous

**Q:** At the end of the autonomous period, the robot can earn 5 points for being parked in the appropriate backstage area. How much of the robot must be within the taped area to earn the bonus points?

**A:** The answer that you seek is found by reading the the definition of **"In"** found in section 4.3 of Game Manual Part 2. The definition of **"In"** in section 4.3 is: "An object that has crossed into the upwards vertical extension (i.e., at a right angle to the **\*Playing Field Floor\***) of a defined **\*Area's\*** boundary is **\*Inside\*** the **\*Area\***. An object that is entirely within the upwards vertical extension of a defined **\*Area's\*** boundary is **\*Completely Inside\*** the **\*Area\***. The boundary element (tape, wall, markings, etc.) is part of the **\*Area\*** for the purposes of determining **\*Inside\*** and **\*Outside\***, unless otherwise specified." The **\*Autonomous Navigation\*** task requirements are satisfied if the **\*Robot\*** is **\*Parked\*** (i.e., motionless) and any portion of the **\*Robot\*** has crossed into the upwards vertical extension (i.e., at a right angle to the **\*Playing Field Floor\***) of the **\*Backstage\*** taped boundary. **\*\*Pro Tip:\*\*** The scoring referee has a short period of time between the end of the **\*Autonomous Period\*** and the start of the **\*Driver-Controlled Period\*** to record all of the **\*Autonomous Period Scoring\*** tasks. **\*Teams\*** can help the scoring referee accurately record an **\*Alliance's\*** scoring tasks by designing their **\*Autonomous\*** software so that their **\*Robot\*** is unambiguously **\*In\*** the **\*Backstage\*** at the end of the period.

( Asked by **14903** answered Oct 17th 23 )

## Q117 How about making drones like these planes?

**Q:** Trying to make paper drones like these planes... <https://thetravelbible.com/wp-content/uploads/2023/08/tim-samedov-10-1600x900.jpg>  
<https://i.stack.imgur.com/orPsV.jpg> <https://external-content.duckduckgo.com/u/?u=https%3A%2F%2Ftsel1.mm.bing.net%2Fth%3Fid%3DOIP.IA1GE6CtrJyVQyR3W7bc3AAAAA%26pid%3DApi&f=1&ipt=3f426fc713fe25df6dfcd0c4d8b67173bd6161>  
 OK or not?

**A:** We cannot make a decision on hypothetical Drones. When you have a Drone built from allowable materials please submit the photo and we will rule on the legality of the design.

( Asked by **21852** answered Oct 17th 23 )

## Q118 Team Prop size

**Q:** Can the Team Prop be cone or cylinder or water cup of base radius and its height more than 3" but less than 4"?

**A:** Yes, a cone shaped Game Element with a base between 3" and 4" in diameter and between 3" and 4" tall meets TE04.

( Asked by **23305** answered Oct 17th 23 )

## Q119 Definition of COTS Battery

**Q:** Per RE12 F.ii, it states that an external COTS USB battery pack is allowed to power LEDs on the robot. What is considered an external COTS battery pack? What are the limitations on said battery packs? Additionally, are converters designed to pull 12V from the battery pack such as <https://www.amazon.com/dp/B08NRM6X2Y> allowed? It would be connected to this adapter to allow use with the REV Blinkin <https://www.amazon.com/dp/B0BHNNWJMD>.

**A:** The COTS USB battery pack mentioned in RE12.f.ii is a simple USB charging battery intended to allow mobile recharging of USB powered devices (phones, tablets, etc). There are many [examples](<https://www.anker.com/products/a1287>) available from many sources. Thank you for asking about Battery Pack limitations. COTS USB Battery Packs are limited to a capacity of 27,000mAh or less. This is also the standard [TSA limit](<https://www.faa.gov/hazmat/packsafe/lithium-batteries>) for taking Lithium-containing COTS USB Battery Packs (with 3.7V cells) onto aircraft in the USA. COTS USB Battery Packs that adhere to the USB-PD or USB-QC specification may be used to provide a 12V source as described. Please ensure that the COTS USB External Battery is in no way connected to the robot's power system. When using COTS USB External Battery Packs for legal LED and related uses, please observe a heightened level of vigilance in their safe use. The [Robot Controller Power Distribution page]([https://ftc-docs.firstinspires.org/en/latest/control\\_hard\\_compon/rc\\_components/power\\_distr/power-distr.html](https://ftc-docs.firstinspires.org/en/latest/control_hard_compon/rc_components/power_distr/power-distr.html)) on ftc-docs has been updated with proper guidance for [using COTS USB External Battery Packs]([https://ftc-docs.firstinspires.org/en/latest/control\\_hard\\_compon/rc\\_components/power\\_distr/power-distr.html#cots-usb-battery-pack](https://ftc-docs.firstinspires.org/en/latest/control_hard_compon/rc_components/power_distr/power-distr.html#cots-usb-battery-pack)). Please review this information prior to using any COTS USB External Batteries.

( Asked by **8693** answered Oct 24th 23 )

## Q120 Glitter PETG for team prop?

**Q:** The team prop can not be retroreflective. We 3D print a prop using PETG red transparent with glitter. It does not return a light beam back to it's source. Is this acceptable to use? The glitter in the filament is reflective but it is not retroreflective per the definition of "Retroreflection occurs when a surface returns a large portion of directed light beam back to its source. Retroreflective materials appear brightest to observers nearest the light source"

**A:** No, this is not a legal material. Red transparent PETG with metal flake does not satisfy rule TE02 for being a uniform color.

( Asked by **20349** answered Oct 17th 23 )

## Q121 May a team cut a notch in their Drone?

**Q:** Is it allowed to cut (or tear) a notch in the drone to aid in launching?

**A:** Yes, Teams may make cuts in their Drones provided no other rules are violated.

( Asked by **21533** answered Oct 17th 23 )

## Q122 Does the drone have to be red or blue?

**Q:** states that we may use a color printer to achieve the required red and blue colors. I know the drone has to have the team number to be easily identifiable, but does it have to be colored to match our alliance color?

**A:** Rule DR03 states that "The predominant color of a Drone must match the Team's assigned Alliance color for the Match (red or blue)".

( Asked by **19591** answered Oct 17th 23 )

## Q123 I2C to SPI protocol converter legality

**Q:** Is this COTS I2C to SPI converter legal as per RE11.f? <https://www.mikroe.com/i2c-to-spi-click> A legal sensor with an SPI interface would be connected to the converter and the converter would be connected only to the I2C port of a Control or Expansion Hub.

**A:** Yes, this I2C to SPI converter is an example of the types of protocol converters allowed by RE11.f

( Asked by **21028** answered Oct 18th 23 )

## Q124 Possession of pixels on backdrop clarification.

**Q:** Q57 makes it clear that pixels on the backdrop do not count toward the possession limit. If a robot is holding two pixels, will it incur possession penalties by removing a pixel from the backdrop (therefore no longer being supported by the backdrop) and placing it back on the backdrop?

**A:** The answer that you seek is found by reviewing the \*Robot Control/Possession\* limits for \*Scoring Elements\* rule (GS05). After removing the \*Pixel\* from the \*Backdrop\*, the \*Robot\* in this scenario is no longer protected by rule GS05.c.v and is therefore \*Possessing\* three (3) \*Pixels\*, one (1) more than the maximum allowed number of \*Pixels\* per rule GS05.a. The \*Robot/Alliance\* should receive an immediate \*Minor Penalty\* for \*Possessing\* one \*Pixel\* over the allowed limit of two (2) \*Pixels\*. An additional \*Minor Penalty\* for the excess \*Possessed Pixel\* should be assessed for each 5-second interval that the \*Robot\* continues to \*Possesses\* three (3) \*Pixels\*. If the \*Robot\* \*Scores\* a \*Pixel\* on the \*Backdrop\* or in the \*Backstage\* while \*Possessing\* three (3) \*Pixels\*, the \*Robot/Alliance\* will receive an additional \*Minor Penalty\* per rule GS05.b.

( Asked by **8693** answered Oct 19th 23 )

## Q125 Communication Between the Drive Team Coach and the Human Player

**Q:** Q1: May the drive team coach use a white board or pre-printed signs to communicate with the human player on color and placement of pixels in the wing? Q2: May the drive team coach move around the Alliance Station to be closer to the human player and then return to their drive team?

**A:** A1: Yes, \*Drive Team\* members may use signaling aids that satisfy the restrictions listed below. !Q111 provides the \*Human Player\* with guidance for using signaling aids. \*Drive Team\* members in an \*Alliance Station\* may also use signaling aids with additional restrictions to address safety and interference issues that arise from six (6) people occupying a confined space. Guidance for the \*Human Player\* is less restrictive due to the isolated, single occupant \*Human Player Station\*. \*Drive Team\* members may use signaling aids when abiding by the following restrictions: 1) The signaling aids are not a safety hazard. For example, placing a signaling aid on the floor is a tripping hazard. 2) Small hand-held signaling aids, including white boards and pre-printed signs, are allowed. 3) The signaling aid may not be intentionally dropped or placed on the floor. 4) If the signaling aid is accidentally dropped, it will not harm the venue floor. 5) The signaling aid and \*Drive Team\* member do not distract an opposing \*Alliance Drive Team\* per rule G16.c. 6) The \*Drive Team\* member doesn't reach \*Into\* the \*Playing Field\* per rule GS12.h. 7) The signaling aid doesn't use electronics of any type per rule G11. 8) Dropped or placed signaling aid(s) into the \*Playing Field\* are subject to rule G22. A2: Yes, provided that the \*Drive Team\* member remains \*In\* their \*Alliance Station\* per rules G16 and G16a, and does not distract nor interfere with the opposing \*Alliance's Human Player\* or \*Drive Team\* per rule G16.c.

( Asked by **21457** answered Oct 19th 23 )

## Q126 Drone Construction

**Q:** (a) Can we use glue or tape on the drone? (b) Can we apply water to the paper during construction to help folds in the paper become sturdy / stiff?

**A:** A) No, rule DR05d state that no other materials are allowed. This includes tape, glue, paperclips, etc. B) Providing the water has evaporated and it leaves no residue, it is permissible to wet the paper during construction.

( Asked by **21457** answered Oct 19th 23 )

## Q127 Continue on Q117, how do I submit pictures, a pdf file?

**Q:** Continue on Q117, how do I submit pictures, a pdf file?

**A:** There is a new resource "Is your Drone Legal" that contains instructions on how to submit Drone photos. You can find the document at <https://www.firstinspires.org/resource-library/ftc/game-and-season-info>

( Asked by **21852** answered Oct 19th 23 )

## Q128 Glide Path and Drone Legality

**Q:** Q1: In Q100 you cite a "glide path". Is this replacing the "non-ballistic trajectory" Q2: In the new "Is Your Drone Legal?" document, L2 clearly has wings, IL2 clearly has no wings, what is the place where there is "enough wing" between those two designs?

**A:** A1: Glide path and non-ballistic trajectory are interchangeable terms. A2: FIRST strives to compose robot construction rules that can be applied objectively and consistently across all FIRST Tech Challenge competitions. Despite our best efforts to try and write a subjective rule, the application of is subjective. The Inspectors will be looking for Drone characteristics that have the general configuration of an airplane with a defined fuselage and wings that have a reasonable potential for providing meaningful aerodynamic lift. The "Is Your Drone Legal" guide and the Robot Inspector's guide are two resources we made available to teams and inspectors to help you in building legal drones.

( Asked by **15259** answered Oct 19th 23 )

## Q129 Is a drive team coach required for handling the driver station android device?

**Q:** My team doesn't have enough people able to attend the competitions to have the two people necessary to operate the robot, a coach, and a human player. Can we not have a coach and just have the gamepad operators also manage the driver station android device, or do we need to find another person?

**A:** Yes, the \*Drive Team\* is not required to have a \*Coach\*. The \*Drivers\* (i.e., gamepad operators) are allowed to hold the \*Team's Driver Station\* Android device and interact with it to select an Op Mode, view information displayed on the screen, and initialize, start, stop, and reset the \*Robot\* per rule G23. **Note:** Only one (1) \*Human Player\* represents an entire \*Alliance\* in a \*Match\* as stated in the definition of "\*Drive Team\*" in section 4.3 of Game Manual Part 2. The \*Alliance\* selects which \*Team\* supplies the \*Human Player\* for their \*Match\*. The \*Human Player\* that does not represent the \*Alliance\* during the \*Match\* is required to leave the \*Competition Area\* before the \*Alliances\* are directed by field personnel to approach the \*Playing Field\* to set up their \*Robots\*.

( Asked by **19591** answered Oct 19th 23 )

## Q130 Motors moving during initialization

**Q:** RG02 mentions that servos can move during initialization to fit within the sizing limit. Q1: What about motors? If our robot is too large before initialization, can our initialization routine power motors to make the robot fit? Q2: If so, can the motors stay powered/stalling while the robot size is measured?

**A:** A1: Yes, provided that the motors do not stall and the same initialization process is used when setting up the \*Robot\* for a \*Match\*. A2: No, stalling a DC motor for an extended period of time such as Pre-\*Match\* set up and inspection risks damaging the motor (most motors rely on spinning to ensure proper cooling) and consumes a significant amount stored energy from the \*Robot's\* main battery. More importantly, stalled motors can create smoke and noxious gases as well as generate extreme heat within the motor that can lead to fire (depending on the motor and materials surrounding the motor).

( Asked by **18253** answered Oct 25th 23 )

## Q131 Yellow pixel straddling backdrop position corresponding to two spike marks

**Q:** Improbable as it may seem, this has now happened 2-5% of runs, wherein the yellow pixel delivered by the robot in autonomous period jumps around to settle over a position corresponding to two spike marks! The pixel's edge rests over the crest of the backdrop slots. See [https://drive.google.com/open?id=1gIEEtAQ1KHr4CF19mJkUWxGK5fp-6xP&usp=drive\\_fs](https://drive.google.com/open?id=1gIEEtAQ1KHr4CF19mJkUWxGK5fp-6xP&usp=drive_fs) where BLUE robot delivered yellow pixel, for RIGHT team prop location, over a crest. **Q:** Does the team earn yellow pixel placement bonus points?

**A:** A: The \*Pixel\* shown in the image does not satisfy the \*Scoring\* requirements for the \*Autonomous Period Backdrop Randomization Task\*. The \*Pixel\* is not touching a valid \*AprilTag Scoring\* surface; it is balanced on the crest. The \*Pixel\* does earn five (5) points for being \*On\* the recessed \*Scoring\* area of their \*Alliance Backdrop\*. See illustrations E-3, E-4, E-5, and E-6 in Game Manual Part 2 for examples of legally \*Scored Pixels\* for the \*Autonomous Period Backdrop Randomization Task\*.

( Asked by **23312** answered Oct 24th 23 )

## Q132 How to set camera exposure

**Q:** How do you use the ExposureControl classes with the Camera now that Vuforia has been removed from the Library?

**A:** This is not a rule clarification question, but a technical support question. As such, this question should be asked on the [FTC-Community forums](<https://ftc-community.firstinspires.org>) where the FIRST Tech Challenge engineering staff and community members are ready to take your questions.

( Asked by **16760** answered Nov 2nd 23 )

## Q133 Outside home region league event rule

**Q:** May a team participate in another region's league events and their State Championship, if the home region has only the State Championship event? Understand that teams can only advance from their home region and can participate in one league tournament.

**A:** A team can participate in a League outside their region, provided that is the only League they participate in. A team may not advance from a League Tournament to a Regional Championship that is outside of their region unless the Program Delivery Partners in both regions have agreed to move a team to a new region for the entire season.

( Asked by **12611** answered Nov 1st 23 )

## Q134 Stacking Pixels on Spike Marks

**Q:** May the robot place a pixel on top of another pixel on the designated spike mark for both pixels to score?

**A:** The answer that you seek is found by reading the \*Randomization Task\* description in section 4.4.2 of Game Manual Part 2. No, the \*Pre-Loaded\* purple \*Pixel\* is the only \*Pixel\* that is eligible to earn the \*Spike Mark Randomization Task\* points. All other \*Pixels\* on the \*Spike Mark\* have zero \*Score\* value. **Note:** A purple \*Pixel\* \*On\* another \*Pixel\* or \*Team Prop\* that is located \*On\* the \*Spike Mark\* is eligible to earn points for the \*Spike Mark Randomization Task\*, provided that if the underlying \*Pixel\* or \*Team Prop\* were removed, the purple \*Pixel\* would be \*On\* the correct \*Spike Mark\*. (The note was updated on November 7, 2023.)

( Asked by **15317** answered Oct 24th 23 )

## Q135 Legal or not drone not answered yet

**Q:** I have submitted the pdf file for a design through the special link to upload file, no answer yet, or I am not looking at the right place? Q117, Q127

**A:** The review process is now operational. Please remember that all submissions must be of a final, match ready Drone. That means the color must be correct, it must have a Team Number, be made from the allowed materials, and be the correct size and shape. A Drone violating any of the DR rules will be deemed illegal.

( Asked by **21852** answered Nov 15th 23 )

## Q136 Voltage Sensor

**Q:** Are digital voltmeters allowed? (This is the one we have been using: [https://www.amazon.com/gp/product/B086RHJ95R/ref=ppx\\_yo\\_dt\\_b\\_asin\\_title\\_o00\\_s00?ie=UTF8&th=1](https://www.amazon.com/gp/product/B086RHJ95R/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&th=1)).

**A:** The referenced voltage sensor is not allowed because it is not powered by a REV Expansion Hub or REV Control Hub via analog, digital, encoder, or I2C ports as required by rule RE05.c in Game Manual Part 2.

( Asked by **14840** answered Oct 26th 23 )

## Q137 May a Human player place Pixels into the Field during Autonomous period?

**Q:** In the rulebook we could see no mention of a penalty for the Human Player placing Pixels in their Wing during Autonomous. Is it allowed for a Human Player to place Pixels during Autonomous for the purpose of scoring additional Pixels?

**A:** The answer that you seek is found by reading the *\*Human Player\** constraints rule (GS12.b) in Game Manual Part 2. No, *\*Drones\** and *\*Pixels\** may be placed or dropped into the *\*Wing\** only during the *\*Driver-Controlled Period\** per rule GS12.b. Each violation of this rule during the *\*Autonomous Period\** or during the transition between the *\*Autonomous\** and *\*Driver-Controlled Periods\** results in a *\*Minor Penalty\**.

( Asked by **18069** answered Oct 25th 23 )

## Q138 Follow Up to Q130

**Q:** We wanted to confirm that the answer to 2) is a change from last year's response, which said stalling was allowed. For clarification, we wanted to pose another case: during initialization (both during inspection & pre-game) could we have the motors that power our lift move so that the lift is raised to a specific height? In this instance, the motor is not stalling: it is running to a position and then holding that position, the same way a servo holds its position while the robot is initialized.

**A:** Motors and servos "hold position" very differently. Motors with a load applied to their motor shaft can "hold position" through mechanical friction (via a gearbox/gear train) or through stalling. Servos with a load applied to their splines generally only "hold position" through stalling. If the motor can "hold position" even when power is no longer being applied to the motor, then that is legal. If power must be applied to the motor to hold position, it's not legal.

( Asked by **18253** answered Oct 25th 23 )

## Q139 Purple Pixel scoring exactly on Spike Mark

**Q:** 4.2.2 #3a, 4.4.2 #2a and forum answers indicate that the purple pixel must be placed On the randomly selected Spike Mark to score. Appendix E – Randomization E-1 through E-5 show the white pixel on the spike mark Scoring examples E-7, E-8, and E-9 show bonus scored when a purple pixel was on the taped line or on the white pixel; purple pixel was not exactly on the spike mark center line to score bonus. Question: Does the purple pixel score bonus if purple pixel is anywhere On the correct tape?

**A:** The answer that you seek is found by reading the definition of *\*Spike Mark\** in section 4.3 and the *\*Scoring\** requirement stated in section 4.4.2 #2.a in Game Manual Part 2. From section 4.3, the *\*Spike Mark\** is the entire one (1) inch wide by twelve (12) inch long piece of tape. The *\*Randomization Task Scoring\** task requirement from section 4.4.2 #2.a is that the purple *\*Pixel\** must be placed *\*On\** the designated *\*Spike Mark\**. Combining the definition of *\*Spike Mark\** with the *\*Randomization Task Scoring\** task requirement, the purple *\*Pixel\** can be anywhere *\*On\** the correct tape line to be eligible to earn the *\*Spike Mark Randomization Task\** points.

( Asked by **16011** answered Oct 25th 23 )

## Q140 Team Numbers on Team Prop

**Q:** I see that in b & c, team numbers must be no more than 0.5 inch in height. and may only appear on the team prop one time. It looks like this rule may apply to team numbers that are on the team prop in a color other than red or blue. If the team has designed & 3D printed a team prop that includes their team number as a part of the 3D print (i.e. completely red or blue 3D printed material), and the team number is larger than 0.5 and/or appears more than one time, would that be acceptable?

**A:** 3D printed numbers must follow the same rules as any other method. Therefore, a Team Prop that includes their team number as part of the 3D print and is larger than .5 inch or appears more than once is not allowed.

( Asked by **9848** answered Oct 26th 23 )

## Q141 [GND, 3.3V] Buses

**Q:** The [GND, 3.3V] pins on the REV Hubs appear to be on the same internal [GND, 3.3V] buses. Is it permissible to connect the [GND, 3.3V] pins to external [GND, 3.3V] buses? External Bus could be two wires of appropriate gauge on a slip ring or coiled wire. We feel this would simplify wiring for many applications.

**A:** No sharing of GND or 3.3v wiring. For two predominant reasons; - keep the inspection process simple and easy to understand - not all 3.3v ports are internally connected to the same protections circuit.

( Asked by **9999** answered Oct 31st 23 )

## Q142 Drone Bond Paper

**Q:** This paper appears to be legal, 8.5 x 11, 20 LBS, non-coated, Red and Blue, but it says Bond on the label, <https://a.co/d/2cAYTTL>. Bond Paper, [https://en.wikipedia.org/wiki/Bond\\_paper](https://en.wikipedia.org/wiki/Bond_paper), is basically made from high-quality durable fiber pulp.

**A:** Yes, Bond paper is a common printer paper and is an acceptable material for building Drones

( Asked by **18474** answered Oct 26th 23 )

## Q143 Energy source/storage by spring-like mechanisms or rubber bands clarification

**Q:** When RG05 says be careful in the stored energy from spring-like or other mechanisms, Is it then a fair assumption that it is ok to deform a rubber band, spring device, or surgical tubing in a way that stores energy prior to the start of the match. Our intent would be to store energy for the purpose of launching the drone.

**A:** Yes, rubber bands, springs, etc. are all acceptable methods for launching a Drone. The intent of RG05 is not to eliminate stored energy devices but to ensure that teams use them safely. Remember that during a match FTA's may have to access your robot and we don't want anyone hurt if the energy is accidentally released.

( Asked by **6889** answered Oct 29th 23 )

## Q144 Landing Zone In Venues

**Q:** We host in a venue with a stage. The stage is slightly larger than the Playing Field Floor. The Landing Zone will cause us difficulties in hosting. Does the Landing Zone have to be a flat ground or could we erect nets that are placed with PVC pipe at the correct distances. For instance, at 24" there would be a net with the top level with the field. This would allow the Drone to hit it and fall down in the correct zone. Or is it required we build an extension to the stage for the landing zone?

**A:** The use of nets, either vertically or horizontally placed, would go against the intent of the challenge. 1. Vertical nets would trap/capture drones inside a landing zone. 2. Horizontal nets allow the drones to be "caught" in the net. An option would be to look over the venue layout and decide if the stage is the best option for the field, or if there may be a better space within the venue to accommodate the landing zones without the need to build an extension. If not, an extension off the stage may be built to accommodate the landing zones. We recommend placing field personnel (not referees) near the locations where stage and the extension zone meet so that no one walks on the extension. Stanchions or another deterrent from the audience approaching the landing zones should be a consideration to ensure audience members are not accidentally hit with launched drones.

( Asked by **5155** answered Nov 9th 23 )

## Q145 Question About Drone Launching

**Q:** Would it be acceptable to use a bow string (or similar) to launch the paper drones from the robot?

**A:** There is no rule against using a bow string as a stored energy device to launch a Drone providing it is done safely. See Q143 for additional details.

( Asked by **6704** answered Oct 31st 23 )

## Q146 REV Blinkin firmware update and/or customization

**Q:** REV has instructions for updating the firmware in the Blinkin LED Driver, including how to modify the firmware to create custom light patterns. <https://github.com/REVrobotics/Blinkin-Firmware> Q1: Could custom firmware following the "Creating a custom function" instructions solely for producing custom light patterns to indicate the color of pixels held in the robot be legal? Q2: If no, would it still be legal to follow REV's instructions to update the OEM firmware without modification?

**A:** The answer to both questions is no. Updating the REV Blinkin firmware in the described manner would violate RE15 - for allowed modifications as well as RE16 as the system would now effectively be equivalent to a generic programmable device (i.e. arduino, raspberry pi, etc.)

( Asked by **21430** answered Nov 2nd 23 )

## Q147 Robots peeling tape off playing field tiles

**Q:** Some robots have been peeling tape off the field, such as those that include ramps to "scoop" pixels off the field. Q1: Would a team be penalized for peeling tape off the field, either partially or entirely? Q2: If yes, what is the penalty? Would it mean the part itself is illegal (violates a), or the action of peeling the tape is illegal (violates b)? Q3: For example, would a soft ramp that slides along the floor be legal, provided it never peels off tape or causes any other damage?

**A:** A1: Yes, rule S01 is violated if the damage is significant enough to require \*Match\* delaying repair. A2: The consequences of violating rule S01 are described in section 4.5.1 of Game Manual Part 2: "If at any time the \*Robot\* operation is deemed unsafe or has damaged the \*Playing Field\* or another \*Robot\*, by the determination of the referees, the offending \*Robot\* may be \*Disabled\*, and the \*Team\* may be issued a \*Yellow Card\*. Re-inspection of the \*Robot\* is required before it may play another \*Match\*. Damage that requires significant repair and/or delays subsequent \*Match\* play is likely to escalate to a \*Red Card\*." A3: Ramps are not inherently illegal \*Robot\* parts; how the ramp is used in gameplay determines its illegality unless the ramp is identified as having obviously unsafe characteristics during \*Robot\* inspection.

( Asked by **21430** answered Oct 31st 23 )

## Q148 Container for driver control system

**Q:** Last year at the district championship, a referee warned our team that our driver control box limited the screen view for referees. We would appreciate a clarification on how much should be visible to the referee. Our container is a "treasure box" which is part of our team's pirate costume theme. Currently, the treasure box surrounds the driver station on 4 sides plus the bottom, with walls extending to about midway up the REV driver station. Photo link: <https://drive.google.com/file/d/1Ro1>

**A:** The driver control box as it is currently configured is not legal. The current design blocks the view of the field and when opened has a possibility of extending into the field. The box can be made acceptable if the lid were removed completely rather than hinged.

( Asked by **4924** answered Nov 9th 23 )

## Q149 is pneumatics allowed?

**Q:** One of my FTC student is interested in pursuing a pneumatics solution for the claw mechanism. I am trying to lean in and say YES to ideas right now and am exploring any legal or illegal game rules but don't see any related to pneumatics or dc motors with pump valve attachments?

**A:** No, Rule RG01 J expressly forbids the use of pneumatic devices.

( Asked by **23585** answered Oct 29th 23 )

## Q150 Possession Limit Clarification for Pixels on (but not scored on) Backdrop

**Q:** Do pixels that are in contact with or on the backdrop, but not scored on the backdrop, count towards the possession limit defined in GS05.a? Specifically, are they exempted from the possession limit as defined in GS05.c.v and Q57?

**A:** The answer that you seek is found by reading rule GS05.c.v and the definition of the defined term "**\*On\***" in section 4.3 in Game Manual Part 2. "**\*On\***" is defined as: "An object that is physically in contact with and at least partially **\*Supported\*** by an object, surface, etc. is considered **\*On\***". An object that is entirely **\*Supported\*** by an object, surface, etc. is **\*Completely On\***." Rule GS05.c.v: "**\*Pixels On\*** the **\*Backdrop\*** are exempt from the **\*Control/Possession\*** limit." Yes, **\*Pixels On\*** the **\*Backdrop\*** are exempted from the rule GS05.a **\*Possession\*** limit.

( Asked by **16158** answered Oct 31st 23 )

## Q151 Interference while launching a drone

**Q:** The rules state that a team may not interfere with the opposing alliance's drone while in flight and the result is the launching team gets 30 points. What happens if an opponent bumps a robot that is in the process of launching (and altering the path of the drone) without actually touching the drone?

**A:** The gameplay described in the question is not allowed per rule GS11.g.iii. **\*Drive Teams\*** may not directly or indirectly affect the flight of a **\*Drone\***. The **\*Robot\*** in this scenario is under control of the **\*Drive Team\*** during all valid **\*Drone\*** launching times, **\*Robot\*** interactions that affect **\*Drone\*** flight are controlled by the **\*Drive Teams\*** yielding indirect **\*Interference\***.

( Asked by **5218** answered Nov 2nd 23 )

## Q152 May a robot shoot pixels into the backdrop?

**Q:** May a robot use 2 spinning wheels to shoot pixels into the backdrop, while the robot is in the backstage area?

**A:** A **\*Robot\*** may use spinning wheels to eject **\*Pixels\***, provided that the **\*Pixels\*** are not **\*Propelled\*** per rule GS10. A **\*Robot's Pixel\*** manipulator that is adjacent to the **\*Backdrop\*** is allowed to eject **\*Pixels\*** with no more energy than needed to gently place **\*Pixels On\*** the **\*Backdrop\***. The expectation is that the ejected **\*Pixel\*** is in contact with the **\*Backdrop\*** and the wheels are simply used to release the **\*Pixel\*** from the **\*Robot\***. **\*Pixels\*** that are **\*Propelled\*** or ejected with excessive energy for **\*Scoring\*** violates rule GS10.

( Asked by **23845** answered Nov 1st 23 )

## Q153 Is using a laser mouse sensor for odometry legal?

**Q:** Our team is wondering if it's legal to use a laser mouse sensor with SPI protocol (like PMW3389 from <https://www.tindie.com/products/citizenjoe/pmw3389-motion-sensor/>) using a laser, allowed by RE12c and connected to an I2C port on the REV control hub via I2C to SPI bridge (like <https://www.mikroe.com/i2c-to-spi-click>), because we can't connect the sensor to the hub via USB as it seems it's restricted by RE11a.

**A:** Yes, as long as the laser module complies with all applicable rules (i.e. RE12.c) and all protocol converters comply with sensor rules (i.e. RE11.f)

( Asked by **22042** answered Oct 31st 23 )

## Q154 Can the team numbers be on a moving part or the robot?

**Q:** The most visible part of our robot where we could install the team numbers is on our arm. Would we be allowed to install the team number onto the arm even though it moves? Another point of concern is that at some points in the game the team number might be upside down.

**A:** Yes, placing numbers on a moving part of the Robot is allowed providing the numbers are always clearly visible through the range of motion of the mechanism. A Team Number that is temporarily upside down is acceptable.

( Asked by **19591** answered Oct 31st 23 )

## Q155 Clarification on Q78 robot suspension only during buzzer sound

**Q:** In GM Part 2: 4.4.4 - 1. Robot Location – There are two mutually exclusive location-based Scoring opportunities, Robot Location is Scored at End of the Period Q1: Is it accurate to say that as long as the robot is obviously suspended at some point during the end of match buzzer it should be scored as a suspend? Q2: Or must the robot have begun its suspension by the 2:00 mark which is defined as end of period?

**A:** A1: Yes, provided that the **\*Robot\*** does not start **\*Suspending\*** before the **\*End Game Period\*** begins. A2: A **\*Robot\*** is not required to be **\*Suspended\*** before the 2:00 minute time mark.

( Asked by **16750** answered Nov 1st 23 )

## Q156 Are Tile interlocking tabs considered in?

**Q:** Do the interlocking teeth on the edge of a foam tile count as part of the tile for the purposes of starting location (i.e, if a robots wheel is on the jagged edge of a tile, would they be considered "Completely In Tile")?

**A:** No, a \*Robot\* that is \*In\* a \*Tile's\* interlocking teeth is \*In\* more than one \*Tile\*. The \*Pre-Match Robot\* set up requirement is that the \*Robot\* is \*Completely In\* only one (1) of the required \*Tiles\*. See section 4.4.1 item #3 in Game Manual Part 2 for all of the \*Pre-Match Robot\* set up requirements.

( Asked by **16750** answered Nov 1st 23 )

## Q157 18inch rule in terms of flexible tubing

**Q:** When flexible (easily bends) tubing is installed on the robot for intake, can the tubing extend slightly (1/2 inch) beyond the 18-inch boundary of the robot?

**A:** The maximum size of the Robot for starting a Match is 18 inches (wide by 18 inches long by 18 inches high. However, per Rule RG02 b allows for flexible materials surgical tubing to extend up to 0.25 inches (0.635 cm) beyond the 18 inch size constraint. A 1/2" extension is outside of the allowable margin. Consider tucking it in at startup, once the Match starts Robots may expand beyond the starting size constraint.

( Asked by **20373** answered Nov 2nd 23 )

## Q158 Is this a legal way to place Pixels on the Backdrop?

**Q:** Is this a legal way to place Pixels on the Backdrop? Please see link: <https://youtu.be/e8oHDky7nCU?si=VPy0TYTErJ-AJpz2>

**A:** No, the \*Robot's\* actions in this video violate rule GS10 because the \*Pixels\* are \*Propelled\*.

( Asked by **23845** answered Nov 2nd 23 )

## Q159 Question on Digital Break Beam Input Sensors

**Q:** Can you confirm that the following sensor would be legal. <https://www.adafruit.com/product/2168> Its an optical break beam sensor we would like to connect to a digital input on the control hub, can function on either 3.3V or 5V (We understand that for 5V you need Logic Level Converter)

**A:** In general, it is not possible for us to rule on the legality of all potential sensors. When determining the legality of a particular sensor, apply the constraints imposed by RE11 as a guide to legality. In this particular case, the "sensor" you are asking about is in two distinct parts; an IR LED emitter and a IR detector. As long as the IR emitter is connected and powered in accordance with RE12 and the IR detector meets the constraints of RE11, the combination would be allowed

( Asked by **9225** answered Nov 8th 23 )

## Q160 Can we use previous years game elements

**Q:** Team props are required to match the team alliance (red or blue). Could we use a game element from a previous year that is already colored red and blue as our team prop provided that it fits within the 4x4x4 sizing range for team props?

**A:** We believe Q73 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by **19591** answered Nov 7th 23 )

## Q161 What are the lines at the front of field where pixels are stacked called?

**Q:** The team is working on programming and wants to have all the correct terms. We were wondering what the front white tape lines are called where the pixels are stacked?

**A:** There is no official name for those lines. If you must call them something, use "On-field Pixel Stack lines."

( Asked by **130** answered Nov 7th 23 )

## Q162 Alternate level shifter

**Q:** The Rev level shifters were made for motor encoders and are not connectorized in a way that's easy for other uses. Since use of the 5V Aux port is dis-allowed for sensors, would this equivalent level shifter be considered legal? <https://www.adafruit.com/product/5649>

**A:** Yes. This is an example of the types of level-shifters allowed by RE14.j

( Asked by **6055** answered Nov 15th 23 )

## Q163 Robot signaling to Human Player

**Q:** Ref. , Q125, & Q111, Drive Team communication to Robot, for signaling to the Human Player. permits use of the Driver Station for "operating the robot". Is it still legal, if its purpose is to signal the Human Player? e.g.: A Driver Station command causes a Robot-mounted servo to raise a colored semaphore flag, or illuminate an indicator light on the Robot. The Human Player sees this signal, and selects a colored pixel to place in the wing, based on the color of the flag, or light.

**A:** The action described is legal, provided that the signaling device does not distract or interfere with an opposing \*Alliance Drive Team\* per rules RE12.b, and G16.c.

( Asked by **16102** answered Nov 8th 23 )

## Q164 Drone paper modifications

**Q:** Requesting a clarification on what modifications to the drone paper are allowed. Notches are allowed and paper smaller than 8.5x11 is allowed. Q1: Can the starting sheet of paper be an irregular shape as long as it is smaller than 8.5x11 and a single piece? Q2: During construction, can pieces of the paper be trimmed with scissors and discarded - final drone is still single sheet. Q3: Can the drone have holes cut or punched in the paper assuming the cut-outs are discarded.

**A:** A1: Yes, the starting size of the paper can be any shape as long as it is equal to or smaller than 8 1/2 x 11 or A4. A2: Yes, the paper can be trimmed as long as the cut off parts are discarded. A3: Yes, holes may be cut out of the paper.

( Asked by **19746** answered Nov 7th 23 )

## Q165 Autonomous Initialization Routine gamepad control

**Q:** During pre-match robot setup, is it legal to include code to enable gamepad functionality during the autonomous initialization routine? For example, is it allowed to have the gamepad buttons control a servo to open and close a gripper to preload pixels before the referee signals that pre-match set up is complete.

**A:** Yes, provided that the operation is performed safely and does not delay the start of a \*Match\* (G13.e).

( Asked by **23414** answered Nov 8th 23 )

## Q166 Clarification on Q155 for robot that begins climb after timer hits 0:00

**Q:** The answers to Q18 and Q78 make sense to me, but Q155 seems confusing related to a match I saw on webcast. A robot was still touching the ground at 0:00 when the buzzer started and the robot only left the floor while the buzzer was sounding. The definition of "Scored at the End of the Period" makes me think this would not count as a suspended robot, but Q155 makes me think it might.

**A:** Thank you for identifying the inconsistency between the answers to !Q18 and !Q155. !Q18 was updated on November 6, 2023 to include the end of \*Match\* scoring system buzzer length is a "grace period" for completing the \*End Game Suspension\* task.

( Asked by **10723** answered Nov 8th 23 )

## Q167 In alliance's wing during autonomous

**Q:** During autonomous we want to pass between the spike mark and the wall; however, we move through the opposing alliance's wing. Rule GS09 states that it is a major penalty but does that apply to autonomous?

**A:** A \*Robot\* moving through the opposing \*Alliance's Wing\* during the \*Autonomous Period\* should be excused from violating rule GS09 per rule G10. \*\*Note:\*\* The first action for a \*Robot\* that is \*In\* or \*Blocking\* access to the opposing \*Alliance's Wing\* at the start of the \*Driver-Controlled Period\* should be to immediately move away per rule GS09.

( Asked by **21457** answered Nov 8th 23 )

## Q168 Pre-placed white pixels

**Q:** Rule GS03.c is applicable to pre-stacked white pixels in the opposing alliance half of the playing field. Q1: Is the opposing alliance stack close to their wing / human player or is it the stack closest to their spike marks? Q2: During the driver-controlled period can a robot knock over the pre-placed white pixels in the opposing alliances half of the playing field? Q3: during autonomous can the robot knock over the pre-placed white pixels closest to our spike marks?

**A:** A1: The answer that you seek is found by reading rule GS03.a. Rule GS03.a states in part: "\*Tiles\* A, B, C constitute the blue side of the \*Playing Field\*, \*Tiles\* D, E, F constitute the red side of the \*Playing Field\*." \*Tile\* location nomenclature is described in Game Manual Part 2 Appendix B. Therefore, each \*Alliance's\* half of the \*Playing Field\* contains three (3) \*Pixel Stacks\*. The \*Pixel Stacks\* in \*Tiles\* B1, B1/C1, and C1 are on the blue \*Alliance's\* half of the \*Playing Field\*. \*Pixel Stacks\* in \*Tiles\* D1, D1/E1, and E1 are on the red \*Alliance's\* half of the \*Playing Field\*. A2: We believe that !Q112 answers your question. A3: We believe that !Q112 answers your question.

( Asked by **21457** answered Nov 8th 23 )

## Q169 Clarification of answer to Q141 - sharing of GND and 3.3v wires.

**Q:** Q141 says "No sharing of GND or 3.3v wiring." (full stop), which inspectors or officials could read more broadly than we think is intended. We seek to clarify Q141's answer. The analog/digital ports are designed to support two sensor inputs per physical port, e.g. using a REV-31-1386 sensor splitter cable. Q1: Can two or more sensors connected to a common digital/analog physical port share its GND/3.3v wires? Q2: Can multiple I2C devices sharing a common I2C port (bus) share its GND/3.3v wires?

**A:** !Q141 was meant to clarify that the power/ground bus used by sensors/pathways to provide signals should be scoped to the ports/connectors that provided it. For example, Digital Connector 0/1 on the Control Hub provides a power/ground plane intended to be used to power sensors/pathways to provide a signal for Digital Channel 0 and/or Digital Channel 1 - not for a device/pathway providing signal to Digital Channel 2 nor for Analog Channel 0, and certainly not for powering an I2C device chain.

( Asked by **7172** answered Nov 8th 23 )

## Q170 Intaking the bottom two pixels off the pixel stack

**Q:** Our intake uses two spinning wheels to suck pixels off the mat and into our robot. Q1: During autonomous can our intake suck in the bottom two pixels off the stack of 5 pixels (on our alliance side) leaving the top 3 to fall wherever including off the white line without getting a penalty? Q2: During driver-control can we do the same thing without getting a penalty?

**A:** The answers that you seek are found by reading rule GS05.c in Game Manual Part 2. A1: Yes, subject to the constraints specified in rule GS05; the three (3) \*Pixels\* that are not \*Possessed\* by the \*Robot\* must be: a) no longer stacked (i.e., knocked over); or b) stacked \*On\* the white tape line. A2: Same answer as A1.

( Asked by **16646** answered Nov 8th 23 )

## Q171 Can a Silver Sharpie be used to add the team number to the drone?

**Q:** Sharpie offers 2 types of silver pens (1) Sharpie Oil-based Paint Marker and (2) Sharpie Permanent Marker. I believe that the paint marker is not allowed and that the permanent marker is allowed. Can you state if either are legal per ?

**A:** A1: Per Rule DR05b, the oil-based paint version of the Sharpie is not allowed. A2: The standard Sharpie Permanent Marker is legal. Remember, the reason for requiring a Team Number is so that Drones can be returned to the Teams post Match. Any attempt to "game the rules" by adding weight by the use of excess ink or other marking materials will result in the Drone being disallowed.

( Asked by **21457** answered Nov 7th 23 )

## Q172 Clarification on powering USB hub for Control Hub (RE13/RE14)

**Q:** RE13.b.ii specifies that Vision Cameras can connect to REV Control Hub (Robot Controller) using a "powered USB hub", but doesn't mention allowed power sources for the USB hub. RE14.c.ii mentions energy sources for a powered USB hub, but RE14 also says "smartphone" robot controller device and RE14.c.ii refers only to connecting the hub to an Expansion Hub USB. Thus RE14 perhaps excludes the Control Hub USB. **Q:** Can a USB hub connected to a Control Hub be powered by sources listed in RE14.c.ii?

**A:** Yes, powered USB Hubs may only draw energy from the sources listed in RE14.c.ii.

( Asked by **7172** answered Nov 8th 23 )

## Q173 Team Prop in opposing alliance's side of the playing field

**Q:** Q1: During the autonomous period a robot moves the team prop into the opposing alliance's side of the playing field (e.g., red to blue), is there a penalty? Q2: If the team prop that was moved hits the opposing robot is that a penalty?

**A:** A1: A \*Major Penalty\* will be assessed if the \*Robot\* or the relocated \*Team Prop\* impacts or impedes the opposing \*Alliance's Autonomous Period Scoring\* actions per rule GS03.a. A2: Yes, per rule GS03.a.

( Asked by **23302** answered Nov 8th 23 )

## Q174 Drone Accidentally Hits Human Player

**Q:** What happens if the drone accidentally hits one of the human players and lands in Zone 1?

**A:** The \*Drone\* in this scenario has zero \*Score\* value. Rule GS11.g.iii does not apply.

( Asked by **15036** answered Nov 9th 23 )

## Q175 Suspending prior to end game

**Q:** A robot begins to suspend before the start of the end game period. The drive team realizes their error, returns their robot to the ground and then begins and completes their suspend during the end game portion of the match. How is this scenario scored?

**A:** The consequence for starting the \*Suspension\* task early is described in Section 4.4.4 in Game Manual Part 2: "\*\*End Game\* achievements, other than \*Navigating\*, begun before the start of \*End Game\* are worth zero (0) points". The \*Robot\* in this scenario may regain its eligibility for the \*Suspension\* task by lowering itself to the \*Playing Field Floor\* and disengaging from the \*Rigging\*. \*\*Note:\*\* Disengaging from the \*Rigging\* must be obvious and unambiguous.

( Asked by **20077** answered Nov 9th 23 )

## Q176 Can the team prop have holes in it?

**Q:** If the team prop is 3D printed and all one solid color (red or blue) can the prop have holes in it? For instance a 4x4 inch cube with the team numbers cut out all the way through the cube?

**A:** Yes, A Team Prop may have holes in it. Remember, the Team Number must abide by Rule TE05.

( Asked by **22523** answered Nov 9th 23 )

## Q177 We made a very small drone

**Q:** Our team has found an optimal drone design for our launch system, but its design is strange and we would like to confirm that it is allowed. It has a clearly defined wings and fuselage, and is 1.5 inches long 2 inches wide (Including wingspan) and 1 1/4 inches tall. Is this an acceptable drone design?

**A:** We believe !Q178 answers your question about size. If it does not, please rephrase your question and resubmit. As for the shape, please refer to the document "Is your Drone Legal" located at [https://www.firstinspires.org/sites/default/files/uploads/resource\\_library/ftc/is-your-drone-legal.pdf](https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/is-your-drone-legal.pdf)

( Asked by **23738** answered Nov 9th 23 )

## Q178 Is there a minimum size requirement for the paper drone?

**Q:** Can we have a drone that only uses half or even smaller portion of the standard 8.5x11 paper?

**A:** There is no restriction on the minimum size of a Drone, Teams may use as much or as little of the allowed paper as they wish. However, it is to a Team's benefit to be large enough for the Scoring Referee to see it from 12 - 18 feet away. And the Team Numbers must be legible.

( Asked by **23226** answered Nov 9th 23 )

## Q179 COTS Scissor Lift

**Q:** Are scissor lifts legal (specifically with regard to RM02)? The scissor lift will move up and down. It will be turned by a handle that rotates. This is the only axis of rotation we can identify. Do the lifts contain more than one axis of rotation or not? Link to scissor lift dimensions and information: [https://www.amazon.com/Stainless-Steel-Stand-Table-Laboratory/dp/B07KDXJGX9/ref=sr\\_1\\_3?crid=M7CME9QU2WX2&keywords=mini+scissor+lift&qid=1696890453&sprefix=mini+scissor+lift%2Caps%2C99&sr=8-3](https://www.amazon.com/Stainless-Steel-Stand-Table-Laboratory/dp/B07KDXJGX9/ref=sr_1_3?crid=M7CME9QU2WX2&keywords=mini+scissor+lift&qid=1696890453&sprefix=mini+scissor+lift%2Caps%2C99&sr=8-3)

**A:** Update 11/16/223 Yes, this is a legal COTS mechanism. It meets the single degree of freedom rule. One input (rotation of the leadscrew) for one output (vertical lift of the stage).

( Asked by **18094** answered Nov 15th 23 )

## Q180 Is the drone part of the robot?

**Q:** For inspection purposes, is the drone considered part of the robot? Is it required to fit within the 18" sizing tool when preloaded? Or is the robot measured before the drone is preloaded? For example, the robot is 17.25" wide, but when the drone is preloaded and the robot is measured from the tip of the wing to the far side of the robot it is now 18.5" wide - is this legal and will it pass inspection?

**A:** For sizing purposes, the Drone is not considered part of the Robot. Per Rule RG02a, "Preloaded game elements may extend outside the starting size constraint".

( Asked by **18094** answered Nov 10th 23 )

## Q181 Field wall keeping robot in starting configuration Rule

**Q:** Can a robot with easily flexible parts (such as surgical tubing or a zip tie) start a match with these parts pressed up against the field wall in such a way that they would bend? If this is allowed, then during inspection could a team bend the parts in the same way which they will be bent on the field when a match starts in order to fit within the 18 inch sizing tool since that would be the configuration in which the robot would start the match.

**A:** No, the Robot must be within the 18" x 18" x 18" size without relying on any external forces from the sizing box or the wall.

( Asked by **16449** answered Nov 14th 23 )

## Q182 Can team props be different based on the alliance colors?

**Q:** Our team wants to use a different team prop based on whether we are on the red or blue alliance for each match. Assuming the team props meet all of the other requirements and both are inspected, is it legal to use two different shaped team props based on the alliance color?

**A:** There is no rule requiring that the red and blue Team Props be the same design. All Team Props must pass Inspection prior to use in a match.

( Asked by **18119** answered Nov 14th 23 )

## Q183 Allowable Power Switch Label

**Q:** Rule specifies the requirements for the robot's main power switch label. Does the label shown in the rule have to be made from paper or can an appropriately sized and colored 3D printed replica of the label be used in place of the paper label? One example of a 3D printed power label can be found here <https://www.thingiverse.com/thing:3097705>.

**A:** A multi-color plastic label is allowed if it is visually identical to the power button image shown in Game Manual Part 1 rule RE01. The 3D printed power label referenced in the question is allowed because it is visually identical to the required label. The label has a white background, a red dashed line border, and the correct interior elements colored in black.

( Asked by **21490** answered Nov 16th 23 )

## Q184 Is modifying the case of a webcam legal?

**Q:** Is modifying the housing of the vision sensor circuit/PCB legal? To be clear, we are not modifying the circuit, only the case of the webcam. The 3D printed housing wouldn't affect the safety. says "Approved electrical and electronic devices may be modified to make them more usable; they may not be modified internally or in any way that affects their safety." The modification would comply with and . Documentation of the modification could be presented at inspection.

**A:** Modifications to the housing of a vision sensor are acceptable as long as the modifications don't obscure the identification of the vision sensor for robot inspectors

( Asked by **11206** answered Nov 21st 23 )

## Q185 How long does the drive team have to start their autonomous op mode?

**Q:** If we communicate with our alliance and find out that our autonomous modes would collide with each other, would we be able to wait to activate our autonomous until their robot has safely passed the point of collision? Another way of saying it is, how long do we have to start our autonomous after the autonomous period has started?

**A:** The answer that you seek is found by reading section 4.4.2 and rule G19 in Game Manual Part 2. No, delaying the start of the \*Autonomous\* Op Mode is illegal human operation of the \*Robot\* during the \*Autonomous\* gameplay period. The \*Autonomous\* Op Mode must start immediately following the "3-2-1 Go" \*Match\* start countdown.

( Asked by **19591** answered Nov 16th 23 )

## Q186 Drone flight path height

**Q:** Rule RG07 states the robot must not propel the drone with enough velocity to exceed 5' in height. If a robot is designed and inspected to follow this rule, but during gameplay the drone exceeds 5' in height, is this a penalty? Is the drone still scored?

**A:** We believe !Q30 answers your question. If it does not, please rephrase your question and resubmit. The first instance of violating the Drone trajectory constraints during gameplay will not be penalized and the Drone is eligible to earn points for Parking In a Landing Zone. If a referee believes that the Drone exceeded the constraints described in rule RG07, the Drone must be reinspected before it can be used again in a Match.

( Asked by **21311** answered Nov 16th 23 )

## Q187 Legality of goBilda linear servo and servo-driven gear rack

**Q:** Are the following COTS components from goBilda legal under RM02? 1. Hitec Linear Servo (<https://www.gobilda.com/hitec-linear-servo-100mm-stroke-4-1mm-sec-22-2kg-thrust/>) 2. Servo-Driven Gear Rack Kit (<https://www.gobilda.com/servo-driven-gear-rack-kit-single-gear-rack/>)

**A:** A1: Yes, the linear servo is a legal 3 wire servo. A2: Yes, rack and pinions are legal.

( Asked by **23216** answered Nov 16th 23 )

## Q188 Scoring Alliance's Pixels from their Backstage Area

**Q:** Are robots allowed to pick up scored pixels from their alliance's backstage area to place them on the backdrop without incurring a penalty?

**A:** Yes, \*Robots\* may move \*Scored Pixel\*s from their \*Alliance's Backstage\* to a \*Scoring\* location \*On\* their \*Alliance's Backdrop\*.

( Asked by **12868** answered Nov 16th 23 )

## Q189 Penalty for Robot Outside Vertical Plane

**Q:** If a robot extends beyond the vertical plane of the field is there a penalty incurred? It is only for a moment as it drops a pixel, spins around, and begins cycling again. This happened in autonomous for us, but it could be during driver-controlled as the team controls the bot.

**A:** \*Robots\* that extend \*Outside\* the \*Playing Field Perimeter\* are potentially unsafe. Per rule S02, \*Robot\* contact with anything \*Outside\* the \*Playing Field Perimeter\* should result in a \*Yellow Card\* and if there is danger in allowing the \*Robot\* to continue operation, it should be \*Disabled\*. Rarely occurring, \*Inadvertent\*, safe extension \*Outside\* the \*Playing Field Perimeter\* should not be \*Penalized\*. Repeated \*Robot\* extensions \*Outside\* the \*Playing Field Perimeter\* is no longer considered to be \*Inadvertent\* and is therefore not allowed.

( Asked by **12868** answered Nov 16th 23 )

## Q190 Double Pixel Claw

**Q:** We have a claw design that can grab 2 pixels at once from a stack in autonomous. If the claw grabs the top and bottom pixel, then rotates which dumps out the middle 3 pixels, is that legal, or is that considered possessing/controlling? The robot is not, otherwise, moving.

**A:** The \*Robot\* is \*Controlling\* five (5) \*Pixels\*, a violation of rule GS05.a.

( Asked by **19760** answered Nov 16th 23 )

## Q191 Roughtop tread used in something other than drivetrain

**Q:** a. says "The following types of...parts are not allowed: Those used in a Robot drive system that could potentially damage the Playing Field and/or Scoring Elements such as high traction wheels and high grip tread." The legal/illegal parts document seems to flat-out ban the HiGrip Wheel and Rough top Tread. If those parts were used in a way that were unlikely to damage anything (say high grip tread as flappy intake), would they be allowed?

**A:** High grip tread may not be used in any device that contacts the tile floor due to potential damage to the soft rubber tile. However, the tread may be used elsewhere on the Robot, provided that it does not damage Game Elements

( Asked by **10723** answered Nov 16th 23 )

## Q192 Team prop patterns

**Q:** What patterns are allowed on the team prop? I know we can't have qr codes and ARUCO codes. But are patterns of lines or circles allowed? As long as they are a shade of red or blue of course

**A:** Based on the feedback we have received from Teams and volunteers we are clarifying and relaxing the restrictions on the types of images that are allowed on the Team Prop. The intent of rule TE03b is: 1. prevent the use of any object on the field that could confuse or distract other Robots. 2. prevent the use of canned solutions to simplify the task of object identification. Therefore, any image that resembles a QR code, AprilTag, or coded vision target is not allowed. All other images such as team logos, sponsor logos, raised areas, cut outs, etc. are allowed, providing no other rule is violated.

( Asked by **18035** answered Nov 16th 23 )

## Q193 GoBilda Servo Voltage range acceptable for rule RE10?

**Q:** Our team is new and wanted to confirm whether this servo was acceptable for use. RE10 states that servos that are compatible with the REV control hub are acceptable to use (three-wire servo connector, etc). There's also a separate requirement for it to not exceed 6V. The GoBilda servo 2000 Series Dual Servo Dual Mode (SKU: 2000-

0025-0002) has a voltage range of 4.8V-7.4V (pulse amplitude of 3-5V). Thank you.

**A:** We believe the wording of the existing servo rules may be a bit misleading in their intent with respect to operating voltages. Servos that are compatible with a 5-6v range are allowed. The REV Expansion and Control Hubs produce 5v servo outputs. The REV Servo Power Module produces 6v.

( Asked by **23676** answered Nov 21st 23 )

## Q194 Team prop for blue side can be purple?

**Q:** Can our team prop for the blue side be a shade of purple? How about if our Team prop for the red side is pink?

**A:** Purple is not an acceptable color for the blue side Team Prop.

( Asked by **20077** answered Nov 16th 23 )

## Q195 Carabiners Allowable?

**Q:** Are carabiners allowable parts?

**A:** Yes, carabiners are a legal COTS part.

( Asked by **6168** answered Nov 21st 23 )

## Q196 Clarification on Wound Springs and Degrees of Freedom

**Q:** Regarding RM02 Would a sub assembly that contains a wound spring but produces a linear motion be allowed (as a single DOF)? Specific examples being a tape measure and a retractable badge holder. In both cases the body internally contains an inaccessible rotary mechanism, but what extends from the body (metal tape and string respectively) is linear. Would the gimbal fitting on the end of the badge holder be disallowed as an added DOF? If so, could we modify the badge holder to remove?

**A:** Tape measures and similar devices, like a badge holder, are allowed. There is no need to take off the gimbaled fitting on the badge holder.

( Asked by **21606** answered Nov 21st 23 )

## Q197 Are team logos considered fiducial markers?

**Q:** Our team logo is a pair of eyes. Are we allowed to embed our logo into a 3D-printed team prop?

**A:** Based on the feedback we have received from Teams and volunteers we are clarifying and relaxing the restrictions on the types of images that are allowed on the Team Prop. The intent of rule TE03b is: 1. prevent the use of any object on the field that could confuse or distract other Robots. 2. prevent the use of canned solutions to simplify the task of object identification. Therefore, any image that resembles a QR code, AprilTag, or coded vision target is not allowed. All other images such as team logos, sponsor logos, raised areas, cut outs, etc. are allowed, providing no other rule is violated.

( Asked by **5484** answered Nov 21st 23 )

## Q198 Double Sided Tape

**Q:** Can double-sided adhesive be used on our "pixel-picking up device" on our robot? We've designed a flat plate with double-sided crafting tape that is slightly sticky, leaves no residue and cannot actually reach the playing field. It can release pixels with a push rod system. More than happy to provide photos to help with description.

**A:** No, double-sided adhesive cannot be used on a "pixel-picking up" device. Any adhesive contact with a game element, scoring element, or field element is prohibited.

( Asked by **21485** answered Nov 21st 23 )

## Q199 Is it legal to use an inline USB isolator to prevent ESD problems with the Logitech C270

**Q:** We continue to have control hub crashing issues due to ESD when the Logitech camera is plugged into any of the usb ports. we've identified that it only crashes when the robot makes metal connection with the field elements, and only when the usb camera is connected. Is it legal to use an inline USB isolator such as an ADUM3160?

**A:** Yes. This is an example of the types of USB surge protectors allowed by RE14.a.

( Asked by **14670** answered Nov 28th 23 )

## Q200 Playing Field Under-Tile Strap Setup

**Q:** Q1: Must field straps on a competition Playing Field be set up according to manufacturer's directions? With an AndyMark Field, for example, must the 2 straps be set up as indicated in AndyMark's "FIRST Tech Challenge Field Perimeter Setup Guide?" This matters because the hooks on the Field edge push the tile up unevenly, so an inconsistent auto/driving experience exists between fields with differing setups. Q2: If field straps or perimeters are set up incorrectly, may Teams request it be fixed?

**A:** Thank you for pointing out the impact of the under-tile strap on the foam tiles and the importance of having consistency across all \*Playing Fields\*. A1: Please follow the instructions in the [CENTERSTAGE Field Setup Guide](https://firstinspiresst01.blob.core.windows.net/first-in-show-ftc/field-assembly-and-setup-guide.pdf) for where to place the under tile straps (a little off-center). The document was recently updated on 12/7/23. A2: If \*Teams\* see that the field is set up incorrectly, they may request it be fixed. Keep in mind the rule G12 constraints for \*Playing Field\* access.

( Asked by **8672** answered Dec 14th 23 )

## Q201 Clarification on stack movement penalties.

**Q:** Given no other rule violations, should these result in a pixel control penalty: Q1: Plowing over the pre-stacked pixels in driver-controlled? Q2: Plowing over the pre-stacked pixels on the corresponding alliance's side in autonomous?

**A:** We believe !Q13, !Q112, and !Q168 answers your question. If they do not, please rephrase your question and resubmit. A1: No penalty, per rule GS05.c.i. A2: No penalty, per rule GS05.c.i.

( Asked by 16617 answered Nov 22nd 23 )

## Q202 Fiducial Legality under RM06c

**Q:** In GM1 RM06c, fiducial images of any type are disallowed for Robot construction. In Q192 and Q197, patterns, logos, and images of any type are interpreted as fiducial and disallowed under TE03 because of this. a) Does RM06c use the same definition of "fiducial", and thus prohibit use of patterns (such as patterned pocketing) and team/sponsor logos on team robots? b) Does RM06c concern any fiducial markings on COTS parts? A specific example would be the barcodes on Andymark NeveRest Motors.

**A:** The answers to Q192 and 197 have been updated as follows. If this does not answer your question please re-submit. Based on the feedback we have received from Teams and volunteers we are clarifying and relaxing the restrictions on the types of images that are allowed on the Team Prop. The intent of rule TE03b is: 1. prevent the use of any object on the field that could confuse or distract other Robots. 2. prevent the use of canned solutions to simplify the task of object identification. Therefore, any image that resembles a QR code, AprilTag, or coded vision target is not allowed. All other images such as team logos, sponsor logos, raised areas, cut outs, etc. are allowed, providing no other rule is violated. Fiducials as part of a COTS label are allowed.

( Asked by 16461 answered Nov 30th 23 )

## Q203 Pipe height minimum

**Q:** The game manual 2 C-6 Truss and Rigging (pdf page 36) shows the fixed yellow pipe height to be "~14", allowing some height variation. But how much? 1/8"? 1/4"? 1"? 3"? Can FIRST provide a required minimum height so teams can be sure their robots will travel under the fixed pipe? This is especially important at tournaments where field inspection can be done before matches.

**A:** We believe that the answers you are looking for can be found by reading and understanding G08 and the explanatory orange box below it in Game Manual Part 2. The specification for the yellow bar height is approximately 14". Applying the tolerances would suggest that a team should expect possible variations in the height of the yellow bars. Teams should take into account the risks that come with not paying attention to these potential variations. As is mentioned in the orange box, events strive to setup and maintain a much more accurate setup/placement of their fields and game elements, but teams should take the tolerances into consideration when designing and building their robots.

( Asked by 6567 answered Nov 30th 23 )

## Q204 Team Prop Design

**Q:** As an extension to some Team Prop Questions. Q1:If a 3d printed team prop is designed to look like a cute cartoon robot, may it have eyes engraved/extruded in it since Q176 allows for holes in team props, or would those be considered fiduciary markers as per Q197? Q2:Are decorative designs engraved/extruded into a prop allowed if not used for vision control?

**A:** The answers to Q192 and 197 have been updated as follows. Based on the feedback we have received from Teams and volunteers we are clarifying and relaxing the restrictions on the types of images that are allowed on the Team Prop. The intent of rule TE03b is: 1. prevent the use of any object on the field that could confuse or distract other Robots. 2. prevent the use of canned solutions to simplify the task of object identification. Therefore, any image that resembles a QR code, AprilTag, or coded vision target is not allowed. All other images such as team logos, sponsor logos, raised areas, cut outs, etc. are allowed, providing no other rule is violated. A1: Yes, this would be legal. A2: Yes, engraved/extruded designs are allowed provided they do not violate the requirements outlined above.

( Asked by 15259 answered Nov 30th 23 )

## Q205 During autonomous, can a total of 25 pts be earned w/ a purple pixel (Tape + Backdrop) ?

**Q:** During autonomous play, after earning 20 points by placing a purple pixel next to the Team Prop on the Spike Tape, can the purple pixel be picked up and placed on the backdrop for an additional 5 points?

**A:** The answer that you seek is found by reading section 4.4.2 and the definition of "\*Scored at Rest\*" in Game Manual Part 2. No, the \*Autonomous Period Scoring\* achievements are "\*Scored at Rest\*" (i.e., when the entire field has come to rest after the end of the \*Autonomous Period\*). The \*Score\* value of the purple \*Pixel\* is determined based on its location at the end of the \*Autonomous Period\*.

( Asked by 48 answered Nov 27th 23 )

## Q206 Are there any penalties for robots colliding with each other during autonomous play?

**Q:** Are there any penalties for robots colliding with each other during autonomous play?

**A:** The answer that you seek is found by reading rule GS03 in Game Manual Part 2. Yes, per rule GS03.a.

( Asked by 48 answered Nov 27th 23 )

## Q207 During autonomous play, can points be scored by placing white pixels on Backdrop?

**Q:** During autonomous play, can points be scored by moving up to 2 pixels at a time from one of the pre-existing stacks of white pixels to the backdrop?

**A:** The answer that you seek is found by reading section 4.4.2 in Game Manual Part 2. Yes, All \*Pixels Scored On\* the recessed \*Scoring\* area of the \*Backdrop\* during the \*Autonomous Period\* earn five (5) points per \*Pixel\*.

( Asked by 48 answered Nov 27th 23 )

## Q208 During autonomous play, can 25 points be earned by placing yellow pixel on backdrop?

**Q:** After placing the purple pixel next to the Team Prop on the Spike Tape, 5 points can be earned by placing the yellow pixel on the backdrop. If the yellow pixel is placed in the position specified by the Spike Tape/April Tag, then will the team earn an additional 20 points for a total of 25 points?

**A:** The answer that you seek is found by reading section 4.4.2 in Game Manual Part 2. Yes.

( Asked by 48 answered Nov 27th 23 )

## Q209 Venue floor for audience landing zone

**Q:** What is the intended floor for the Audience scoring zone for the drones? Some venues may have carpet and some are polished gym floors. I have seen some venues put foam tiles in the scoring zone. I have also been to gyms where they put tarps down for the robotics fields. The implications to a teams end game score could be reliant on the friction of the scoring zone? Is there an ideal floor? Say for higher stakes meets, where teams can get eliminated? Like for state, regional or worlds?

**A:** The answer you seek is found in the definition of Landing Zone in Game Manual Part 2. Quoted here: >Recognize that \*Landing Zone\* surfaces and marking materials may vary from event to event. Potential surfaces include hardwood floors, carpeting, gym tarp, cement, tiles, mats, etc. Potential marking materials include tape, paint, etc. Teams should plan for these variances when competing at different events. It is encouraged for Event Organizers to let teams know what the Landing Zone properties are. We do not have any recommendation for what an ideal surface is.

( Asked by 20077 answered Nov 30th 23 )

## Q210 Team Prop Interference in Autonomous

**Q:** When placing the purple pixel and traversing between each half of the field, Robots often displace their Team Prop. If the Team Prop were to be unintentionally displaced in a way that affects the opposing alliance's autonomous movement, would that be regarded as autonomous interference?

**A:** We believe !Q173 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by 14525 answered Nov 27th 23 )

## Q211 Pixel in both backstages at once

**Q:** Q1: Our question is about a pixel that is in both the backstages at ones does this mean it is scored for both alliances? Q2: And if so is it a penalty for moving that pixel to only your backstage (officially descoring it for the opposing alliance)

**A:** A1: No, a \*Pixel\* straddling the small nexus of the two \*Backstage Areas\* does not count as \*Scored\* for either \*Alliance\*. A2: The question is not applicable since the \*Pixel\* is not in a \*Scored\* state while it is in both \*Alliances' Backstage Areas\*.

( Asked by 19444 answered Nov 27th 23 )

## Q212 Team Numbers and definition of height

**Q:** b) The Team number may be no more than 0.5 inches (1.27 cm) in height. The formal definition of height is: the distance from the bottom to the top of something, the distance upward from a given level to a fixed point, or something measured vertically. Is a 3D-printed cylinder with numbers raised by ~0.25" on the top face be considered legal height for TE05 subrule (b) where a box of dims ~0.75" x ~2.0" would enclose the numbers as viewed from above?

**A:** Rule TE05 b refers to the height of the text from the bottom edge of the number to the top edge of the number as viewed perpendicular to the text. The rule does not restrict the distance that a number is extruded from a surface. When viewed from above, the numbers must fit into a box no larger than .5" height. The length of the box is dependent on the number of digits in your team number and is not restricted.

( Asked by 519 answered Nov 29th 23 )

## Q213 Regarding Team Prop patterns

**Q:** In Q192 and Q197, it was noted that patterns, logos, or images are prohibited as fiducial markers under TE03. We are wondering specifically if this will affect our team props depending on the interpretation of "pattern". We want to ask if this ruling will apply to the circular indentations on our props, which are cubes that have indentations placed on each side to make them look like 6-sided dice (DICE is our team name).

**A:** The answers to Q192 and Q197 have been updated as follows: Based on the feedback we have received from Teams and volunteers we are clarifying and relaxing the restrictions on the types of images that are allowed on the Team Prop. The intent of rule TE03b is: 1. prevent the use of any object on the field that could confuse or distract other Robots. 2. prevent the use of canned solutions to simplify the task of object identification. Therefore, any image that resembles a QR code, AprilTag, or coded vision target is not allowed. All other images such as team logos, sponsor logos, raised areas, cut outs, etc. are allowed, providing no other rule is violated. A Team Prop made as you described is legal providing all other rules are met.

( Asked by 5126 answered Nov 30th 23 )

## Q214 Autonomous Setup

**Q:** As long as it doesn't delay the game, can the drive team use one of the pre-loaded pixels to space the robot off the tile teeth, then place it in the robot before initialization?

**A:** No, per Rule \*\*G15\*\*, you may not use a \*Pixel\* to align the \*Robot\*. \*Pixels\* are not a legal component of the \*Robot\*.

( Asked by **14840** answered Nov 30th 23 )

## Q215 Are we allowed to use Logitech 920 camera with the mount that comes attached to it?

**Q:** Are we allowed to use the Logitech 920 Camera, with the mount that comes attached to it out-of-the-box, as an FTC-legal vision camera or do we need to somehow remove the included camera mount?

**A:** The camera may be used with the attached mount. Teams are not required to remove it.

( Asked by **48** answered Dec 4th 23 )

## Q216 Descoring in auto

**Q:** If red alliance properly places a purple pixel during auto (with team prop recognition) and blue alliance descors it, the pixel does not score at end of auto (at rest). Does red alliance score 0 and blue receive only a minor penalty, turning a 20 pt advantage to only 5? In other words, does blue benefit from descoring pixels when it should not?

**A:** We believe !Q47 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by **5218** answered Dec 4th 23 )

## Q217 Yellow Pixel Randomization Points - Balanced on the correct April Tag backdrop peak

**Q:** If a yellow pixel straddles/balances on the crest directly above the correct April Tag, does that count as touching one of the two scoring surfaces? Since either side of the crest is a scoring surface and by translation the peak is part of the surface, does that earn the Randomization - Yellow Pixel points? Picture for reference - [https://drive.google.com/file/d/1SIT-g4-zA1L\\_zsd574yC\\_y1PldLTi9PU/view?usp=sharing](https://drive.google.com/file/d/1SIT-g4-zA1L_zsd574yC_y1PldLTi9PU/view?usp=sharing)

**A:** We believe !Q131 answers your question. If it does not, please rephrase your question and resubmit. The \*Pixel\* does not earn the \*Randomization Task Score\* because it is not touching a valid \*AprilTag Scoring\* surface; it is balanced on the crest.

( Asked by **9974** answered Dec 6th 23 )

## Q218 Yellow preload balancing on crest between 2 slots of the same zone

**Q:** The answer to Q131 states that the yellow preload would not score because it is not touching a valid scoring surface and instead "balanced on the crest". However, that situation was with the preload in between scoring surfaces 2 and 3. If the preload is instead balanced on the crest of a single scoring surface corresponding to the correct randomization and does not cross the boundaries of any other surface, does it still receive the randomization task points?

**A:** We believe !Q131 answers your question. If it does not, please rephrase your question and resubmit. The \*Pixel\* does not earn the \*Randomization Task Score\* because it is not touching a valid \*AprilTag Scoring\* surface; it is balanced on the crest.

( Asked by **19953** answered Dec 6th 23 )

## Q219 Hook Placement Prior to End Game

**Q:** Can a hook in a non-weight bearing mode be placed on the rigging prior to end game and once end game begins then have a winch activate to start using the hook then to bear the weight of the robot to suspend it?

**A:** No, the \*Robot\* in this scenario is not eligible to earn points for being \*Suspended\* because it began the \*Scoring\* task before the start of the \*End Game\*. The \*Robot\* in this scenario may regain its eligibility for the \*Suspension\* task by removing the hook from the \*Rigging\*.

( Asked by **6168** answered Dec 4th 23 )

## Q220 Folding drone wings in launcher

**Q:** Can the drone wings be folded against the fuselage when loaded into the robot's launcher?

**A:** The act of folding a \*Drone's\* wings against the fuselage when it is loaded into the \*Robot's\* launcher does not violate any gameplay rules. The concern is that a \*Launched Drone\* with folded wings may not comply with rule GS11.f and therefore, would not be eligible to earn points for the \*Drone Launch\* achievement. A \*Launched Drone\* must match the configuration that passed inspection per rule GS11.f. Since a \*Drone\* with wings folded against the fuselage would not pass inspection, the wings would need to open when released by the \*Robot\*. If the \*Drone\* returns to its legal inspection configuration (i.e. the wings are open/deployed) as it separates from the \*Robot\*, the \*Drone\* described in the question is eligible to earn points for the the \*Drone Launching\* achievement.

( Asked by **18505** answered Dec 5th 23 )

## Q221 Pixel suspended on backdrop

**Q:** We had a pixel that became suspended on the backdrop on its own and stayed there for over 5 minutes while other pixels were being moved around. See picture - <https://ibb.co/Y2msW8v> While unlikely, would this pixel qualify for the Set Bonus?

**A:** No, the \*Pixel\* in the photo is resting on top of the \*Set Line\*, it does not satisfy the Game Manual Part 2 section 4.4.3 \*Set Bonus\* requirement that ""Scored Pixels On\* a \*Backdrop\* extend \*In\* a horizontal \*Set Line\*." The intent of the \*Set Bonus\* achievement is for stacked group of \*Scored Pixels\* to extend upward from the bottom of the \*Backdrop\* so that one or more of the \*Pixels\* extends \*In\* a \*Set Line\*.

( Asked by **5126** answered Dec 5th 23 )

## Q222 Does a mosaic have to be surrounded by white pixels to count?

**Q:** It is my understanding that a mosaic is made up of 3 color pixels (all the same color or all different colors) and not touching another mosaic or color pixels. Recently I was told it is only a mosaic if surrounded by white pixels. Can someone please clarify this for me? Thank you!!

**A:** A \*Mosaic\* does not have to be surrounded by white \*Pixels\* to count as \*Scored\* per the definition of \*Mosaic\* in section 4.3 of Game Manual Part 2. Mosaics "A" and "D" in Appendix F, illustration F-2 are examples of legal \*Mosaics\* that are not surrounded by white \*Pixels\*.

( Asked by **23213** answered Dec 5th 23 )

## Q223 Can a LED screen, which displays real-time video from Logitech C920, be mounted to robot?

**Q:** Can an LED screen, which displays real-time video from Logitech C920 vision camera, can be mounted to robot (we would like to use the display like a rear-view camera during tele-op gameplay)?

**A:** No. An LED video display screen (or any other video display screen) would fall under RE16 - Additional Electronics and is not allowed.

( Asked by **48** answered Dec 7th 23 )

## Q224 Robot Collision During Autonomous

**Q:** Q1: How is a violation determined when two robots collide at the center line of the field during the autonomous phase? Q2: If both sides cross the center line, are both penalized? Q3: If the blue alliance robot crosses the centerline, is the penalty against the blue alliance?

**A:** A1: Using the definition of **"Interference"** found in section 4.3 of Game Manual Part 2, the referee will apply the **"Autonomous Interference"** rule (GS03.a) as appropriate. For example, which **"Alliance Robot"** crossed **"Into"** the opposing **"Alliance's"** half of the **"Playing Field"**. A2: The referee will make the rule GS03.a determination based on the sequence of gameplay events. For example, the **"Robot"** that crossed into the opposing **"Alliance's"** half of the **"Playing Field"** first will most likely be viewed as the instigator of the **"Interference"**. A3: Yes, a **"Robot"** that crosses into the opposing **"Alliance's"** half of the **"Playing Field"** and then **"Interferes"** with an opposing **"Alliance Robot"** will receive the rule GS03.a **"Penalty"**.

( Asked by **17257** answered Dec 7th 23 )

## Q225 Blocking access to the wing - GS09

**Q:** Q1: Is an opposing alliance's robot exempt from GS09 and block/blocking rules if they are attempting to intake a white pixel from directly in front of the opposing alliance's wing and blocking any access to their wing? Q2: Does the answer to Q1 change if they're 'intaking' involves shadowing the opposing alliance robot unintentionally, moving parallel to the wing tape line? Q3: Is there any clarification of how driver intention can alter a referee's judgement of the application of GS09.b?

**A:** A1: No, rule GS09 applies to this scenario. A2: No. A3: The intention of the **"Blocking Robot's Drive Team"** is not a factor when applying rule GS09.b to a gameplay scenario.

( Asked by **23331** answered Dec 7th 23 )

## Q226 Human Player - Mirror Signal Tool

**Q:** The drive team can't see around the robot. May the human player hold a mirror to help the drive team properly align/find the pixels?

**A:** This is a creative, but disallowed strategy for overcoming the referenced gameplay challenge. The **"Human Player"** may not use a mirror at the competition **"Playing Field"** due to concerns about distracting the opposing **"Alliance Drive Team"** (G16.c), distracting field personnel, and safety.

( Asked by **6272** answered Dec 7th 23 )

## Q227 Pre-loading game elements prior to set-up complete signal

**Q:** Per 4.4.1 Pre-Match 3.g robots must remain motionless prior to the start of the match. Does this preclude robots from actuating servos when init is pressed in order to grasp game elements? Does this preclude actions like homing an arm? If a drive team determines that a game element is not held correctly before the set-up complete signal are they allowed to reset the robot and attempt to pre-load the game elements again?

**A:** We believe !Q165 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by **23410** answered Dec 7th 23 )

## Q228 Changing playing field game element sides during elimination matches

**Q:** Hello, during this past week's regional the backdrops on the fields each have a different shape to them just due to the plastic and no bracing across the back. The inwards bow is a distinct advantage to pixels staying on the board vs outwards. We fully understand the tolerances of the field but later in the season I would ask FIRST to consider Red to Blue backdrop swap between elimination matches to ensure that neither team has a field advantage. There is time between matches to do so.

**A:** The suggested red/blue **"Backdrop"** swap between elimination **"Matches"** is not allowed. The red and blue **"Backdrops"** are not interchangeable due to **"AprilTag"** differences. A **"Backdrop"** with a game changing shortcoming such as significant damage or incorrect assembly should be repaired or replaced before playing the next **"Match"**. A "small inwards bow" in a **"Backdrop Scoring Area"** is likely to be viewed by the Head Referee as normal variation caused by manufacturing and assembly tolerances that does not require repair or replacement for **"Match"** play to continue.

( Asked by **9225** answered Dec 13th 23 )

## Q229 Servo current limit on REV control hub

**Q:** The inspection checklist states that servos must not exceed the manufacturer specs for the controller . The REV control hub has a 2 amp limit per servo port pair (<https://docs.revrobotics.com/duo-control/control-system-overview/control-hub-basics>). Commonly used GoBilda servos have a stall current of 2 amps at 4.8V and 2.5 amps at 6V. So the GoBilda servo could use slightly more than 2 amps at 5V (REV hub output). Does that mean a GoBilda servo cannot be directly connected to the REV hub?

**A:** Servos are allowed to be directly connected to the REV Hubs (Control and Expansion) as long as the Voltage range of the servo is compatible with the hub (see RE10). Current draw is not a factor for compatibility, only for performance. For a much more in-depth answer, please visit [this FTC-Community forum post](<https://ftc-community.firstinspires.org/t/rev-control-hub-servo-port-compatibility/858>).

( Asked by **14343** answered Dec 12th 23 )

## Q230 Re-inspected drones exceeding height limit again

**Q:** During a competition, we were observing some drones going over the 5 foot limit as stated in RG07. However, after passing the re-inspection, we were wondering what happens after the re-inspected drones go over the 5 foot limit again? Since RG07 is a robot inspection rule, we're worried that this would mean using an illegal component, which might be interpreted as an I01 violation, resulting in disqualification

**A:** We believe !Q233 answers your question. If it does not, please rephrase your question and resubmit. As long as the \*Team\* is working with the event volunteers (referees, inspectors, etc.) to resolve the rule RG07 violations, the Head Referee is unlikely to \*Penalize\* or issue a \*Yellow Card\* for repeated incidents.

( Asked by **16750** answered Dec 19th 23 )

## Q231 Clarification of Scoring Randomization Tasks

**Q:** The following statement is from section 4.4.2: "A Robot may only use its own Pre-Loaded Pixels to earn Randomization Task points." What scores would be given to the following scenarios? Q1: Robot A places its yellow pixel is on the backdrop. Robot B drops a pixel on the backdrop that happens to hit A's yellow pixel moving it into the correct randomization position. Q2: Robot A has no autonomous program. Robot B pushes Robot A into A's purple pixel until it is on the correct spike mark.

**A:** The intent of the statement: "A \*Robot\* may only use its own \*Pre-Loaded Pixels\* to earn \*Randomization Task\* points" is for the \*Robot\* to \*Control\* and place its own \*Pre-Loaded Pixels\* into the \*Scoring Area\*. A1: This scenario satisfies the intent that a \*Robot Controls\* and places its own \*Pre-Loaded Pixels\* into the \*Scoring Area\*. \*Robot\* A's \*Pixel\* is eligible to earn the \*Backdrop Randomization Task\* points. \*Robot\* A's \*Pixel\* would not be eligible to earn the \*Backdrop Randomization Task\* points if \*Robot\* B directly moved \*Robot\* A's \*Pixel\* to the correct \*Scoring\* location. A2: The \*Robot's\* actions in this scenario do not comply with the intent stated above. \*Robot\* A's purple \*Pixel\* is not eligible to earn the \*Spike Mark Randomization Task\* points.

( Asked by **14343** answered Dec 18th 23 )

## Q232 Custom Control Award submission

**Q:** Are Custom control award submissions created on programs such as Canva, Adobe Illustrator or other graphic design programs allowed or must control award submissions be submitted on the form published on firstinspires.org?

**A:** The use of programs such as Canva and Adobe Illustrator are allowed.

( Asked by **20403** answered Dec 21st 23 )

## Q233 Penalties for Drone Parking beyond Landing Zone 3

**Q:** Q1: Based on rule RG07, how would the following be judged with regards to penalties, including yellow cards for repeated incidents as per C03? We understand that 0 points would be earned in all cases: Q2: A launched Drone is in flight for less than 18', contacts the ground in LZ3, but slides and Parks at a location beyond LZ3 but less than 18' from the launch point. Q3: Same as 1, but Parks beyond 18' from the launch point. Q4: A launched Drone flies less than 18', but lands just past LZ3?

**A:** A1: As long as the \*Team\* is working with the event volunteers (referees, inspectors, etc.) to resolve the rule RG07 violations, the Head Referee is unlikely to \*Penalize\* or issue a \*Yellow Card\* for repeated incidents. A2: No \*Penalty\*. A3: No \*Penalty\*, the 18 foot maximum trajectory length is the distance the \*Drone\* travels in the air. The added distance due to sliding, bouncing, etc, does not count towards the rule RG07 maximum trajectory length. A4: No \*Penalty\*.

( Asked by **7842** answered Dec 13th 23 )

## Q234 Driver station android device

**Q:** Android devices/phones listed in the legal parts list are pretty old Motorola models. Are we allowed to use a newer Motorola G model as our driver station Android device?

**A:** The only legal Android devices/phones are enumerated in RE07, as long as they meet the requirements of RS03. No other Android devices/phones are allowed. There are a lot of challenges with trying to support general Android smartphones, especially since Android isn't a standard across the industry and instead each manufacturer forks and manages their own "flavor" of each version of Android. These different "flavors" of Android can have different behaviors regarding Wi-Fi management, permissions management, lifetime and update schedules, and other things that cause great hardships in terms of application and device support especially for remotely controlling robots. The REV Driver Hub is intended to be our long-term Android support device and is the direct replacement for COTS Android smartphones.

( Asked by **23216** answered Dec 14th 23 )

## Q235 Prop color shade vs. tint

**Q:** Game Rule TE02 - ...Team Game Element may include multiple shades of the assigned color. A shade of a color is a primary hue color with black added (color will be darker than the original). A tint of a color is a primary color with white added (color will be lighter than the original). Since Q15 answer was yes that light colors (light blue and pink) are allowed, does the rule mean tint (lighter colors) or shade (darker colors) of red or blue?

**A:** Both lighter shades and darker shades of red or blue are allowed for the Team Prop as long as the colors can be clearly distinguished by field personnel as being red or blue.

( Asked by **20079** answered Dec 14th 23 )

## Q236 Follow-up on Q188

**Q:** Q188 discusses taking a pixel from their Alliance's Backstage and scoring on their Alliance's Backdrop. May a robot take a pixel from an opposing Alliance Backdrop or Backstage and score it within their own Backdrop or Backstage?

**A:** The answer that you seek is found by reading rule GS04 in Game Manual Part 2. No, descoring a \*Pixel\* from an opposing \*Alliance's Backstage\* or \*Backdrop\* is not allowed per rule GS04.

( Asked by **20079** answered Dec 13th 23 )

## Q237 Is this bendable fiber glass tube FTC legal?

**Q:** My team began using a bendable piece of fiberglass as the linear actuator that extends the pixels out. However, I was reading the game manual and saw that any part that is not readily available to any team is not FTC legal. Technically any team could get it on the company's website, but they mostly work with military customers, and you have to contact their sales department to get a hold of one. Could we use it on our robot? Link: <https://www.rolatube.com/product/system-50-single-tube-mast-mil/>

**A:** The bendable fiberglass material is legal.

( Asked by **23574** answered Dec 19th 23 )

## Q238 Suspended AND park in endgame?

**Q:** Suppose a robot has capability to suspend itself in the endgame and have an extension to the backstage. Will this give both the points?

**A:** The answer that you seek is found by reading section 4.4.4 item #1 in Game Manual Part 2. A \*Robot\* may only earn points for one of the \*End Game Robot Location\* tasks (\*Suspended\* from the \*Rigging\* or \*Parked In\* the \*Backstage\*). A \*Robot\* that satisfies the requirements for two or more \*Scoring\* achievements earns points only for the highest value achievement per rule G05.

( Asked by **16785** answered Dec 13th 23 )

## Q239 Drone landing zone floor material - Team provided

**Q:** Are we able to bring with us extra field tiles so that we could put them on the drone landing zone? This way, throughout all of the matches, we would have a consistent landing zone for our drone.

**A:** No. \*Teams\* are not allowed to bring \*Landing Zone\* floor material to be used at the event. Please refer to the answer on !Q209 for further details.

( Asked by **18766** answered Dec 14th 23 )

## Q240 More clarification to Q228 on swapping

**Q:** I'm sorry, the question posed wasn't what was meant to be asked. The question is, can FIRST consider the Robots (not the backdrops) swapping sides between elimination matches from Red to Blue to ensure that the field is not an advantage to one team or the other. Much like Football. RED in Match 1, is BLUE in Match 2. The backdrops can definitely affect gameplay this year, both position and deformity. There is a time period between matches where the robots are removed from the field.

**A:** No, the scoring system does not support \*Teams/Robots\* swapping \*Alliances\*. Per !Q228, a \*Backdrop\* with a game changing shortcoming such as significant damage or incorrect assembly should be repaired or replaced before playing the next \*Match\*. A "small inwards bow" in a \*Backdrop Scoring Area\* is likely to be viewed by the Head Referee as normal variation caused by manufacturing and assembly tolerances that does not require repair or replacement for \*Match\* play to continue.

( Asked by **9225** answered Dec 18th 23 )

## Q241 Q188 and Q236 - which is correct?

**Q:** Q1: Since the forum is the final decision in game rules, Q188 would override the GS04 in this case. Q2: Are Q188 or Q236 correct? Q188 says "Robots MAY move Scored Pixels from their Alliance's Backstage", overrides GS04. Q236 states "NO, DESCORING a Pixel from an opposing Alliance's Backstage or Backdrop is NOT ALLOWED"...by GS04. Capitalization added to emphasis differences. I would suggest updating either response so they are consistent. Or is there something in Q188 that I am missing?

**A:** !Q188 and !Q236 are both correct. A1: !Q188 does not override rule GS04. !Q188 and rule GS04 address different gameplay scenarios. Rule GS04 prevents a \*Robot\* from descoring \*Pixels\* from an opposing \*Alliance's Backdrop\* or \*Backstage\*. In other words, a red \*Alliance Robot\* is not allowed to descoring (i.e., remove) a \*Pixel\* from the blue \*Alliance's Backdrop\* or \*Backstage\*. !Q236 is an example of a gameplay scenario that violates rule GS04. !Q188 addresses the scenario where a \*Robot\* descors (i.e., removes) a \*Pixel\* from its own \*Alliance's Backstage\* and then places that \*Pixel On\* their own \*Alliance's Backdrop\*. For example, a red \*Alliance Robot\* descors a \*Pixel\* from the red \*Alliance Backstage\* and places that \*Pixel On\* the red \*Alliance Backdrop\*. This scenario is allowed. In summary, a \*Robot\* may descoring \*Pixels\* from its own \*Alliance's Backdrop\* or \*Backstage\* because there is no rule against this activity. A \*Robot\* may not descoring \*Pixels\* from its opposing \*Alliance's Backdrop\* or \*Backstage\* per rule GS04. A2: !Q188 and !Q236 are both correct. See A1 above for the rationale.

( Asked by **20079** answered Dec 18th 23 )

**Q242 How many of the pixels in the wing could have been placed by the human player?**

**Q:** In Game Manual 2, section d, it is written "There can be a maximum of six Pixels In the Wing at any one time." In the same manual, c, it is written "Human Players may place a maximum of two Pixels...at a time." We thought that meant the human players may place 2 pixels and then, if those have been removed or not, he can place 2 more. Others have said it meant that there can only be 2 pixels in the wing at any time that have been placed there by the human player. Who's right?

A: Each time the \*Human Player\* reaches into the \*Playing Field\* they may place: a) one (1) \*Drone\*, b) one (1) \*Pixel,\* or c) two (2) \*Pixels In\* the \*Wing\*, per rule GS12.c. The maximum \*Pixel\* capacity of a \*Wing\* is six (6) \*Pixels\* per rule GS09.d. The \*Human Player\* may continue to place \*Pixels In\* the \*Wing\* per rule GS12 until the six (6) \*Pixel\* limit is reached, per rule GS09.d. For example: i) There are four (4) \*Pixels In\* the \*Wing\*. The \*Human Player\* has the option of placing either one (1) or two (2) additional \*Pixels\* into the \*Wing\*. ii) There are five (5) \*Pixels In\* the \*Wing\*. The \*Human Player\* may place one (1) additional \*Pixel\* into the \*Wing\*. iii) There are six (6) \*Pixels In\* the \*Wing\*. The \*Human Player\* may not place an additional \*Pixel\* into the \*Wing\*.

( Asked by **21843** answered Dec 18th 23 )

**Q243 Will purple pixel earn point if the team prop was knocked off the line during autonomous**

**Q:** At the end of the autonomous, if the team prop was knocked off the red/blue line, but the purple was placed on the correct spike mark where the team prop was, will the team earn point for the purple pixel?

**A:** The answer that you seek is found by reading the *\*Randomization Task Scoring\** requirements in section 4.4.2 in Game Manual Part 2. Yes, the purple *\*Pixel\** is eligible to earn the *\*Randomization Task\** points. There is no end of the *\*Autonomous Period\** location requirement for the *\*Randomization Object\** (*\*Team Prop\** or the white *\*Pixel\**).

( Asked by **23346** answered Dec 18th 23 )

## Q244 One Way Bearings regarding Degrees of Freedom

**Q:** According to RM02, COTS parts are limited to 1 degree of freedom, and mention how ratcheting wrenches are illegal. One-way bearings have a similar design, so would they break this rule of more than one degree of freedom?

**A:** There are many types and designs of one-way bearings. Some use a system of springs and wedges to prevent backward motion. This is similar to a ratchet and is not allowed. Other types rely on the design of the internal races to prevent reverse motion. This type of bearing is allowed.

( Asked by **10355** answered Dec 19th 23 )

## Q245 Mosiac Contact

**Q:** Appendix F of GM2 defines a mosaic as a "cluster" that is "in contact" with the other pixels. We are asking for clarification on "in contact". Q1: Do the pixels need to be fitted snugly together? Q2: Or, do pixels that are angled, yet still touching 2 others, also count as being "in contact"?

**A:** A1: No. \*Pixels\* in a \*Mosaic\* are not required to be tessellated. A2: Yes.

( Asked by **12868** answered Dec 18th 23 )

**Q247 Can fields at competitions be sprayed before matches with team provided anti-static spray?**

**Q:** If a team provides the Event Host, FTA or Regional Director at an FTC event with anti-static spray, is there precedent for the FTA (or other field staff) to spray the field before matches? Our team has severe issues with static, while using the grounding strap, and our FTA at our competition today (12/16/23 NJ) told us to ask this specific question because our fields have very bad static at every competition in the winter. See 'Managing Electrostatic Discharge Effects' on FTC Docs for precedent.

A: Spraying the playing field tiles is an Event Host decision, regardless of who provides the anti-static spray. The Event Host may use \*FIRST\* recommended antistatic spray provided by any supplier they choose. \*\*Bonus Information:\*\* 1) Is your robot ESD protected? We suggest reviewing the guidance in ["Managing Electrostatic Discharge Effects"]([https://ftc-docs.firstinspires.org/en/latest/hardware\\_and\\_software\\_configuration/configuring/managing\\_esd/managing-esd.html#highlight=%22Managing%20Electrostatic%20Discharge%20Effects](https://ftc-docs.firstinspires.org/en/latest/hardware_and_software_configuration/configuring/managing_esd/managing-esd.html#highlight=%22Managing%20Electrostatic%20Discharge%20Effects)) on FTC Docs. 2) Have you thoroughly inspected your wiring to look for damaged insulation? Pay special attention to sensor and servo wires. 3) Are any power cable connections loose? For example, [are the Control or Expansion Hub X30 Ports compressed?] (<https://docs.revrobotics.com/duo-control/troubleshooting-the-control-system/control-hub-troubleshooting#xt30-pins-are-compressed>)

( Asked by **17036** answered Dec 19th 23 )

### Q248 Uneven floor tiles

**Q:** Should there be any consideration for the playing field tiles to mesh properly, be level and not have teeth projecting upwards in places? Since the game this year involves picking up / dropping pixels from / onto the floor, seems like a great disadvantage to teams using an intake mechanism that needs to be close to the floor or pushing pixels across the field. We understand this might be within the allowed tolerances and therefore maybe nothing can be done about it. Just looking for guidance.

**A:** Yes, \*Tiles\* should be set up uniformly. If you notice an unexpected \*Playing Field\* setup condition, immediately notify a referee or an FTA so that they can address the issue. **\*\*Note:\*\*** For AndyMark \*Playing Field Walls\*, the \*Tile\* bulge caused by the under-\*Tile\* straps is an expected and allowed part of a correctly set up \*Playing Field\*.

( Asked by 4327 answered Dec 21st 23 )

## Q249 Legality of GoBilda Servo Extension

**Q:** Is the GoBilda Servo extension (sku 3802-2745-4527) legal? <https://shorturl.at/krGN0> It is not on the legal or illegal list It seems to be a wire extension as it only passes through the signals. One potential conflict is- Game rule RE14.i.iii states PWM signals must be 22AWG or gauge specified by the manufacturer. Cat6 cable is specified by GoBilda for the extension but Cat6 is normally 23AWG. Summarv- Can we use the extension and use it with a CAT6 cable legally?

**A:** No. The [goBILDA 4 Channel Servo Extension via CAT6](<https://www.gobilda.com/4-channel-servo-extension-via-cat6/>) product is not a legal servo power injector as per RE10. Please note that some servo products, like the goBILDA Servo Extension and goBILDA Servo PDB, are not designed for nor intended to be used with the REV Control Hub or FIRST Tech Challenge Competition electronics. Be sure to consult Game Manual 1 and carefully read all product documentation when evaluating product legality in FIRST Tech Challenge.

( Asked by **8479** answered Dec 19th 23 )

## Q251 Flashing LED Legality

**Q:** states that signalling LED should flash at a rate no faster than 1 hertz. Q1: Is a single or small set (2-3) of flashes where each flash is less than 1 second long disallowed by this? Q2: Is strip of LEDs that has a fast moving pattern, but each LED in the patter, flashes a a rate less than 1 hertz disallowed by this?

**A:** The Orange Box at the bottom of RE12 is a set of recommendations and guidelines. Teams who employ LEDs with quick (>1Hz) flashing or motion patterns must be aware that they may be requested to change or disable their flashing or motion patterns at the discretion of the Head Referee regardless of frequency or duration of the flashing.

( Asked by **18127** answered Dec 19th 23 )

## Q252 Suction, motor, fan, air for CenterStage Intake

**Q:** Rethinking intake for CenterStage. One student's idea is to use SUCTION CUPS for pickup and a motor blowing air through tube(s) to suction cups to release the pixel. The motor would connect to a custom-made fan-like device and tubing. Is this FTC legal?

**A:** No, suction devices are illegal. Rule RG01.j specifically prohibits vacuum based mechanisms.

( Asked by **21377** answered Dec 19th 23 )

## Q253 GS06 and a Disabled Robot G07

**Q:** From our last meet: A blue robot broke down under the red alliance rigging. 1 red robot was suspended but the disabled robot obstructed access for the second red robot. G07 indicates that robot failure does not incur penalties unless specified in a GS rule. GS06 does not specify that a disabled robot will be penalized for impeding a suspension. Could GS06 be considered to allow for disabled penalty? It seems unfair that a team could not score their end-game points for tie-break 2.

**A:** Thank you for the clear description of your concern. You have a correct understanding of how to apply rule G07 to this gameplay scenario. The Game Design Committee (GDC) considered this scenario when the rules were written and they decided not to create an exception to rule G07. The GDC discussed your request during our regular weekly meeting and decided not to change the rules.

( Asked by **16617** answered Jan 2nd 24 )

## Q254 Propelling Pixels from the robot along the floor

**Q:** Our robot uses a rotary intake system for collection. When they get stuck we push them out using the collector. Will we receive a penalty if we stop the pixel within a short distance approx. 6 inches.

**A:** \*Robots\* are allowed to eject \*Pixels\* with no more energy than needed to expel them from their intake system. A gap of six (6) inches between the \*Robot\* and \*Pixel\* may be viewed by the referee as violating rule GS10. In this scenario, \*Pixel\* movement that is \*Inconsequential\* is more likely to be allowed by the referee.

( Asked by **12168** answered Jan 2nd 24 )

## Q255 Can aligner be detached from the robot?

**Q:** Before autonomous starts, our team uses a 18" long gobilda U-channel to help align our robot at the desired starting position. Is it legal if we use this tool for the alignment then remove it from the field?

**A:** The answer that you seek is found by reading rule G15 in Game Manual Part 2. No, the alignment tool described in the question is not part of the \*Robot\*.

( Asked by **23849** answered Jan 2nd 24 )

## Q256 Partner Yellow Pixel Bumped to Scoring Position

**Q:** Following up on Q231. Scenario: Robot A places its yellow pixel in the wrong randomization position on the backdrop. When Robot B places its yellow pixel, it doesn't drop it on the back drop, it drags the pixel it to its final position before releasing. If, during this process, the yellow pixel (and only the yellow pixel) Robot B is controlling contacts Robot A's yellow pixel causing it to end up in a scoring position, did this contact make Robot A's pixel ineligible for scoring the bonus?

**A:** \*Robot\* A's yellow \*Pixel\* is not eligible to earn the the \*Backdrop Randomization Task\* points. The \*Pixel Controlled\* by \*Robot\* B moved \*Robot\* A's yellow \*Pixel\* into the \*Scoring\* location. \*\*Note:\*\* The yellow \*Pixel\* placed on the \*Backdrop\* by \*Robot\* A is eligible to earn five (5) points during the \*Autonomous Period\* for being \*On\* the recessed \*Scoring\* area of the \*Backdrop\*.

( Asked by **9415** answered Jan 2nd 24 )

## Q257 Legality of navX2 MXP and navX2-Micro Navigation Sensors

**Q:** Are either the navX2-Micro Navigation Sensor (<https://www.andymark.com/products/navx2-micro-navigation-sensor>) or the navX2 MXP Navigation Sensor (<https://www.andymark.com/products/navx2-mxp-robotics-navigation-sensor>) legal?

**A:** Compatible external I2C IMU sensors such as the navX2-micro are legal per RE11.a. Be aware that the navX2 MXP is designed specifically to be used as an I/O expansion port for the FIRST Robotics Competition roboRIO controller incorporating a navX2 IMU; the navX2 MXP may not be directly compatible with the REV Control Hub or REV Expansion Hub.

( Asked by **11329** answered Jan 9th 24 )

## Q258 Can I use LED lights for object detection

**Q:** Can I use these lights to illuminate my TGE? [https://www.amazon.ca/DKDY-Lighting-Spotlight-Headlight-Controller/dp/B0B7MQ84L8/ref=sr\\_1\\_6?crid=21S2CMLNK069S&keywords=rc%2Bled%2Blights&qid=1704045274&srefix=rc%2Bled%2Blights%2Caps%2C124&sr=8-6&th=1](https://www.amazon.ca/DKDY-Lighting-Spotlight-Headlight-Controller/dp/B0B7MQ84L8/ref=sr_1_6?crid=21S2CMLNK069S&keywords=rc%2Bled%2Blights&qid=1704045274&srefix=rc%2Bled%2Blights%2Caps%2C124&sr=8-6&th=1) These lights will go through the 5V ports on the REV control hub. Are these lights allowed under the rules in the game manual part 1

**A:** There is not enough information in the descriptions provided to make a yes/no determination. It's not clear from the Amazon product description whether or not the clear domes on the LEDs are focusing lenses, which would not be compatible with RE12.a - from the description and the intent of the product (as well as the stated use in this question) it appears that the intended use is as a "flashlight" which would not be compatible with RE12.a. It is also not clear from the description how bright the LEDs are. RE12.b may apply if the lights are bright enough to potentially interfere with other robots, teams, field personnel, etc.

( Asked by **19530** answered Jan 9th 24 )

## Q259 Drone Color

**Q:** Can we use a felt tip pen to color the drone or does it have to be printed from an inkjet or store bought with the pink, red, or blue color?

**A:** Yes, you may use a felt tip marker to color the Drone.

( Asked by **17346** answered Jan 2nd 24 )

## Q260 Is the TFmini Plus laser sensor from Benewake legal?

**Q:** The TFmini Plus laser sensor from Benewake, marked with 'Exempt' optical characteristics, which are stricter and safer than Class I standards, is also compliant with RE11. Is it legal in this season? the produce url: <https://en.benewake.com/DataDownload/index.aspx?pid=20&lcid=23>

**A:** Yes. IEC/EN 62471 "Exempt" and IEC/EN 60825-1 "Class 1" are both acceptable and equivalent standards for RE11.

( Asked by **19961** answered Jan 9th 24 )

## Q261 Use of Gamepad for Autonomous Selection Post Init Phase Pre Randomization Phase

**Q:** We are aware of the restrictions of touching the gamepad during the autonomous phase. However, this year we are attempting to use a color recognition system for autonomous, and would like to be able to select our alliance color without the need for multiple duplicate OpModes. We are wondering if it is possible to use the gamepad's buttons for color selection AFTER robot initialization, but BEFORE the ref's randomization period. So far we haven't found any specific rules for or against this.

**A:** Yes. **\*\*Note:\*\*** See the related question !Q165.

( Asked by **4711** answered Jan 9th 24 )

## Q262 Robot Moves on Initialization Sticker

**Q:** In previous years, rule RG02 required the robot to have a sticker "Robot Moves on Initialization" if it did move during that phase. This year, that requirement seems to be gone. Is that an oversight or do we not need the sticker anymore?

**A:** The Robot Moves sticker is not required this year. However, Teams may still place this sticker on their Robot if they wish.

( Asked by **20267** answered Jan 9th 24 )

## Q263 Team Game Element Number Location

**Q:** Our team game element is a mug, and has the team number inside the mug. It meets the 1/2 inch height requirement, and is visible from 12 inches away. Our robot inspector was not sure if it was legal, due to it only being visible when looking down into the mug. We figured it was fine since it is for non-gameplay identification purposes only. Do we need to move our team number?

**A:** You are correct that the Team Number is only required for non-gameplay purposes. Having the team number inside the mug or even on the bottom is acceptable.

( Asked by **18119** answered Jan 9th 24 )

## Q264 GoBilda U-channel Sharp Edges

**Q:** Our robot inspector has newly informed us this year that our GoBilda U-channels, which make up much of our robot, have too sharp of corners and need to be filed down. If this is true, that means that nearly all teams need to file down a lot of corners, so we want to know if the sharp edges rule applies to this scenario?

**A:** The Inspectors have the responsibility for determining If the edges or corners have the potential of cutting a person's skin. If they perceive a hazard, then the edges must be filed.

( Asked by **18119** answered Jan 9th 24 )

## Q265 Sidewalls as a reflexive surface?

**Q:** It is understood that a human player may not utilize a mirror during gameplay. Can they, however, use a solid-color material to create a situation that allows for the driver to see the pixels using only the innate reflexiveness of the sidewalls?

**A:** Yes, provided that the material is not within the \*Playing Field Perimeter\*, does not contact the \*Playing Field Wall\*, and does not extend laterally beyond the \*Alliance\*-side \*Playing Field Wall\* corner.

( Asked by 7039 answered Jan 9th 24 )

## Q266 Custom Control Award Form; follow-up to Q232.

**Q:** Does Q232 imply that the control award may take any graphical form or are teams required to adhere to the form published on firstinspires.org? In previous years our team was told we were required to use the template form on firstinspires.org. Q1: Can teams answer the questions listed in the official template using a custom page instead of the one on firstinspires.org? Q2: If teams are allowed to use a custom page, can they deviate from the questions on the official template?

**A:** Teams are permitted to create their own form, but must at a minimum answer the questions on the official template. Font size must be at least 10pts, and the submission may not exceed 2 8.5x11 pages.

( Asked by 8693 answered Jan 18th 24 )

## Q267 Additional clarification to Q66 on possession of multiple drones

**Q:** Q66 Addresses if Blue team drone inadvertently flies into or gets caught up in a Red team robot. Can you also clarify if Red Robot 1 launches a drone and it gets caught in partner Red 2 Robot. Will Red 2 immediately have to fire THEIR drone to not be possessing 2 drones at once and therefore penalized or is this also considered inadvertent? We had a practice round where it fired into their alliance robot and was caught up inside the robot inadvertently.

**A:** The answer to !Q66 applies to this situation with the additional constraint that the \*Robot\* may not attempt to \*Score\* their \*Alliance\* partner's \*Drone\*. \*\*From !Q66:\*\* No \*Penalty\* should be assessed for this \*Inadvertent\* gameplay scenario. The inadvertently \*Possessed Drone\* does not count towards the \*Robot's\* one (1) \*Drone Control/Possession\* limit (GS05.a). The \*Robot\* may continue normal gameplay; trying to "shake off" the stray \*Drone\* is not required.

( Asked by 9225 answered Jan 9th 24 )

## Q268 LED Battery

**Q:** Can I use a second REV battery connected to the Blinkin LED Driver to power the LEDs?

**A:** No. Powering light sources from a 2nd main battery would violate at least two rules: RE03 (only 1 main battery pack per robot) and RE12.f (allowed light source power sources). While a USB battery pack is allowed, it is not equivalent to a 2nd main robot battery. The USB battery pack includes safety features not found with the main robot battery.

( Asked by 17257 answered Jan 10th 24 )

## Q269 Anti-static spray onto robots

**Q:** Rev Robotics has documented issues with the IMU in the newer Control Hubs stating ESD as a major contributor. We understand that the Event Host can decide on the use use anti-static spray on the field. We also understand that teams may spray their robots with anti-static spray as long as it is done outside the venue. Is there a time interval required between the time of spraying a robot and inspection or game play? We are presuming the spraying of the robot can not be done post inspection.

**A:** You are correct that event organizers are encouraged by FIRST to apply staticide on their fields, but it is at their discretion. Teams who wish to apply staticide to their robots can do so at anytime during the competition provided that the spray is fully dry before the robot is introduced to the field. Teams may also be asked by venue hosts to spray outside due to the potential fumes. Be advised that it may take upwards of 1 hour for the spray to fully dry.

( Asked by 4327 answered Jan 17th 24 )

## Q270 Drone hitting audience-side wall

**Q:** If the drone hits the top of the wall closest to the audience before landing, does it score?

**A:** Yes, if the \*Drone Parks In\* a \*Landing Zone\*.

( Asked by 23418 answered Jan 9th 24 )

## Q271 Can the yellow bar be used to stabilize the robot during suspending?

**Q:** Q1: Can the robot use the yellow bar to suspend as long as the primary source of support is the truss. Q2: Can we clamp on to the yellow bar for that extra stabilization support? We have a robot with a long arm that rotates to grab onto the bar. the only issue is that there is a lot of force trying to force the robot back down to the bottom. Q3: Can we add clamps that will grab onto the yellow bar to prevent the robot from rotating after it has suspended?

**A:** A1: Yes, provided that the contact with the yellow bar only provides stabilization per rule GS06.a A2: No, per rule GS06.b. A3: No, per rule GS06.b.

( Asked by 19591 answered Jan 9th 24 )

## Q272 Are phone holders that clip on the controller allowed?

**Q:** A driver for my team is looking to use a phone Mount clip to secure the phone to the game pad, during match driving. This would allow the driver to use his hands more freely and see the phone telemetry while he is driving. Rule DS03 allows mechanical modifications to a game pad controller, but it is unclear if that same rule extends to phones. This is really more of an enhancement, adding a clip to the game pad, but not changing it any way. Can we use the clip?

**A:** A phone mounting clip is allowed providing the field personnel can clearly see the screen.

( Asked by **19460** answered Jan 11th 24 )

## Q273 Clarification on the robot touching the playing field wall during pre-match set up.

**Q:** Need clarification on 4.4.1 3 a iii: Drive Teams must place their Robot, in any orientation, touching the Playing Field Wall adjacent to their Alliance Station. If a robot has a part that extends towards the wall and is higher than the wall in manner that would cross the vertical plane of the wall, would it be considered touching the wall? Or should there be a part of the robot physically touching the wall?

**A:** The \*Robot\* is required to make contact with the \*Playing Field Wall\* during pre-match set up. The \*Robot\* set up described in this scenario is not allowed. **\*\*Note:\*\*** Intentional \*Robot\* extension \*Outside\* the \*Playing Field Perimeter\* for pre-\*Match\* setup is not allowed per the orange box in rule S02.

( Asked by **4327** answered Jan 11th 24 )

## Q274 RG01 -i clarification

**Q:** We were going through the inspection checklist before our competition in a week. Our coach noticed that the aluminum of our intake drags of the floor. Technically grounding the chassis to the field. The rule states that "Those that are designed to electrically ground the Robot frame to the Playing Field" are illegal. Considering the fact that it was not designed for grounding, are we ok? Or should we scramble a replacement material?

**A:** Intakes, or grabbers, that touch the floor are legal providing they do not cause damage to the Tiles during operation.

( Asked by **18045** answered Jan 18th 24 )

## Q275 REV Through Bore Encoder Repair

**Q:** Can the broken casing of my REV Through Bore Encoder be repaired using 3D printing? Is it feasible to use the original manufacturer's CAD to print or design a new casing? I will design a new casing for it but will not modify the internal circuitry. This is an encoder with expensive shipping costs, so we want to repair it.

**A:** Repairing the casing (including using 3D printing) is allowed. Care should be taken not to modify any of the internal circuitry and the repairs should not obscure/hide what the sensor is so that inspectors can easily identify that it is a sensor/encoder. You should also be prepared to explain the process you went through to the robot inspectors at your events.

( Asked by **17257** answered Jan 16th 24 )

## Q276 Tethered Tape Measure as alignment tool: legal?

**Q:** Our team is considering using a tape measure attached with string to align the robot. Q1: Is this legal if the tape measure extends outside the 18 inch limits? Rule G14 indicates that "before the start of the match...each robot may not exceed...18 inches", but rule G15 indicates that we may align with "components...that CAN BE RESET TO BE within the 18 inch cube". Which is correct/applies here? Q2: Is this legal if the tape measure does not ever extend outside the 18 inch limit?

**A:** A1: Yes, the tape measure may extend outside the 18 inch (45.72 cm) \*Robot\* starting size constraint during pre-\*Match\* setup. Keep in mind that \*Robot\* set up may not delay \*Match\* start, interfere with any other \*Team's\* set up, or the activities of any of the field personnel. Rule G14 is intended to apply upon the completion of \*Drive Team's Robot\* set up process. Rule G15 applies to the actions by the \*Drive Team\* to perform their \*Robot\* pre-\*Match\* set up. A2: Yes.

( Asked by **12087** answered Jan 16th 24 )

## Q277 Testing vision systems by placing Team Prop on tape lines

**Q:** To make sure our camera can see all three team prop positions, we would like to try placing it on each of the three tape lines and making sure the robot detects it. Assuming this does not cause an excessive delay of game, is it legal?

**A:** Yes, as long as the movement does not delay \*Match\* start, interfere with any other \*Team's\* set up, or the activities of any of the field personnel.

( Asked by **12087** answered Jan 16th 24 )

## Q278 Interacting with Controllers During Autonomous Init Before Randomization

**Q:** We have a versatile Autonomous opMode, that does different things based on robot starting position. Instead of building multiple versions of the opMode, we would like to build one version and allow our drivers to identify starting location. This would occur after the init button is pressed but before randomization. For example: opMode is selected press init select options with controller put controller down randomization 3-2-1 Press start Would this be allowed?

**A:** We believe !Q261 and !Q165 answers your question. If they do not, please rephrase your question and resubmit.

( Asked by **21606** answered Jan 16th 24 )

## Q279 Field and Landing Zone Definitions

**Q:** A legal drone that passed inspection and was launched in accordance with the rules flies over the perimeter wall and hits landing zone 1 but bounces back towards the perimeter wall frame (tournament was using VEX walls) and partially lands within the wall itself and landing zone one. Does this drone get scored as landing zone one or not scored because the drone is partially within the outside of the extrusion that holds the playing field Wall panels?

**A:** Yes, the \*Drone\* in this scenario is eligible to earn points for being \*Parked In\* a \*Landing Zone\* as an exception to rule GS11.h.

( Asked by **11206** answered Jan 16th 24 )

## Q280 Team prop size and orientation

**Q:** If a 4 inch cube is bisected along the plane passing through opposite edges, and we take a resulting half of the cube (so that two opposing faces are right triangles with adjacent edges of length 4, two faces are 4 inch squares, and the 5th face is a  $4 \times \sqrt{2}$  by 4 rectangle, is this a legal team prop shape if (A) if the prop is placed with the 4 inch square down, or (B) the prop is placed with the rectangle with length  $4 \times \sqrt{2}$  down?

**A:** A1: Yes, in this orientation the Team Prop is legal. A2: No, in this orientation the Team Prop is illegal.

( Asked by **14343** answered Jan 18th 24 )

## Q281 Hitting of long linear slide extensions by opposing alliance robot

**Q:** Suppose Robot A has a long linear slide extension (say, 4 feet). Suppose opposing alliance Robot B, in an attempt to get to a different position, briefly hits this extension and unintentionally causes it to break. Q1: Would this be a penalty under ? Q2: How would the outcome change if, instead of a glancing hit, Robot B broke the extension while attempting to push it out of the way so it could travel forwards? Q3: How would the previous scenarios change if the extension did not break?

**A:** First, two guiding principals for these gameplay scenarios: 1) Regardless of a \*Robot's\* size, \*Drive Teams\* have an obligation not to: damage another \*Robot\* (G26), \*Pin\*, \*Trap\*, or \*Block\* another \*Robot\* (G28), or exercise egregious behavior (G30). 2) \*Robots\* that extend significant distances do not gain gameplay protections. A1: It depends on how the gameplay action is viewed by the referee crew. A light bump or a glancing blow are likely to be viewed as normal gameplay. Repeated \*Robot\* impacts, contact with no clear gameplay purpose, or high energy contact are examples of gameplay that are likely to be viewed as violations of rules G26 or G30. A2: The answer to Q1 applies. A3: The answer to Q1 applies.

( Asked by **14343** answered Jan 18th 24 )

## Q282 Can I use control system signals to control a Blinkin LED Driver that is powered by a USB

**Q:** Can I use control system signals to control a Blinkin LED Driver that is powered by a USB battery pack?

**A:** Yes. In general most COTS LED controlling interface modules, like the REV Blinkin LED Driver, internally isolate the power and the control signals so that they can safely be powered and controlled by different sources. When choosing how to power your LED sources (per RE12.f) and optionally control them (per RE12.d and RE12.e), keep in mind that if using external power sources those external power sources must stay isolated from internal robot power sources. If you're ever unsure, either [ask](https://ftc-community.firstinspires.org/) or find another way.

( Asked by **17257** answered Jan 18th 24 )

## Q283 Team Prop - Team Number

**Q:** Our team props are solid red and blue 3D printed objects with the team number depressed in the object at .5 inches. Can we color in our team number with a with black sharpie or could we color in the team number with a different shade of red or blue on the respective red and blue objects?

**A:** Yes, the numbers may be colored in with a Sharpie. Black or any other color is acceptable.

( Asked by **11848** answered Jan 18th 24 )

## Q284 How will robot inspectors determine that the weight of paper for a drone is legal?

**Q:** .a requires the paper weight to be no more than 20lb (75 g/m2). Given the subtle differences between 20lb (5grams, 0.09mm thickness) and 24lb paper (6grams, 0.12mm thickness) what would a team need to prove that their drone paper is legal?

**A:** If there is concern that the paper exceeds the 20 lb. weight specification requirement, the inspector will ask the team if they have the packaging or a photo of the packaging. Without team provided documentation, inspectors will use their judgment with a team-friendly approach to evaluate the Drone's paper weight specification.

( Asked by **2901** answered Jan 21st 24 )

## Q285 Is there a limitation as to who can be the drive team coach?

**Q:** Must it be a student or can a mentor/coach/parent be the drive team coach as well?

**A:** The *Drive Team Coach* is a *Student* or an adult mentor from the same *Team*. In section 4.3 of the Game Manual Part 2, *Coach* is defined as "A *Student Team* member or adult mentor designated as the *Drive Team* advisor during the *Match* and identified by wearing a *Coach* badge or identifying marker".

( Asked by **23732** answered Jan 24th 24 )

## Q286 Alliance Selection - Different Rules for a State

**Q:** At our last competition, our region declared they had new "Region Specific Alliance Selection Rules" which stated that the first seed could not choose the second seed. Is it allowed for a region to change the rules in only that region? We have our league tournament coming up soon and want to have a clear answer in case they use the region specific rules again.

**A:** All *Matches* at a scrimmage and all *Elimination Matches* at a league meet are not considered official play and may follow different rules at the event host's discretion. *Elimination Matches* at your league *Tournament* or other official *Tournament* should always follow all official *FIRST* Tech Challenge Rules--there are no sanctioned local

*Alliance* selection rules. Please work with your local program delivery partner if you have questions or concerns about the specific enforcement of *Tournament* rules at your event.

( Asked by **17036** answered Jan 24th 24 )

## Q287 Robot interference in end game

**Q:** During the end game a red alliance robot is attempting a drone launch and suspending at the same time a blue alliance robot bumps them. Q1: Do they get the 30 points for the drone parking task? Q2: Do they get points for suspending too?

**A:** A1: This question describes the same gameplay scenario as !Q151. Yes, if the referee believes that the *\*Robot\** contact affected the *\*Drone\**, rule GS11.g.iii is violated and the *\*Drone\** will receive *\*Landing Zone 1\** points (30 points). For example, contact directly before the *\*Drone\** is *\*Launched\** should be considered as affecting the flight of the *\*Drone\**. From !Q151: "The gameplay described in the question is not allowed per rule GS11.g.iii. *\*Drive Teams\** may not directly or indirectly affect the flight of a *\*Drone\**. The *\*Robot\** in this scenario is under control of the *\*Drive Team\** during all valid *\*Drone\** launching times, *\*Robot\** interactions that affect *\*Drone\** flight are controlled by the *\*Drive Teams\** yielding indirect *\*Interference\**." A2: Yes, if the *\*Robot\** satisfies the requirements for being *\*Suspended\**. Depending on the timing of the contact, the blue *\*Alliance Robot\** may receive rule GS06.d and/or GS06.e consequences.

( Asked by **130** answered Jan 23rd 24 )

## Q288 Which VEX parts are legal in FTC Centerstage?

**Q:** I've wanted to know if we can use plates, beams, gears, chains, wheels, connectors from VEX robotics kit?

**A:** VEX structural and electrical elements are treated the same as any other COTS part (e.g. they must meet the single-degree-of-freedom threshold of RM02, allowed materials limitations of RM01, etc...). Note: with the exception of the Vex EDR 393 motor and paired Motor Controller 29, Vex electronics are not allowed.

( Asked by **24311** answered Jan 25th 24 )

## Q289 Clarification on Q18

**Q:** After reading Q18, I still experienced confusion among coaches and referees about the need of match sequence. Q18 defines the end of match buzzer as a 'grace period' in which robots can still complete the suspension task, but I have had coaches say that a team needs to have begun the suspension task before the match timer reads 0:00. Q1: Is this true? Q2: i.e. can a robot be not touching the rigging at 0:00 but then score the suspension bonus if it is suspended by the end of the buzzer?

**A:** A1: No A2: Yes

( Asked by **13312** answered Jan 23rd 24 )

## Q290 How Are "Best Matches" Defined For League Ranking

**Q:** In Game Manual Part 1 Section 5.1, what is the definition of "top ten matches"? For example, let's say that a team has played 15 matches in their league. They have won 10 of them. They have an RP of 2.0. Let's say they had 20 pts in auto for each of those matches won, however, they scored 40 pts in auto in one match they lost and 0 pts for the rest of the matches. Would TBP1 be 20 pts (consisting of matches they won) or 22 pts (from best autonomous score matches, regardless of win/loss)?

**A:** The 10 best *Matches* are chosen such that they maximize the *Team's Ranking*. That is, each *Match* has: 1. *Ranking Points* 2. *TieBreaker Points* (TBP1, autonomous score) 3. *TieBreaker Points* (TBP2, end game score) 4. *Match Score* (including penalties) The "best" 10 *\*Matches\** are selected to maximize the *\*Team's\** rank using the criteria outlined in game manual part 1, as shown above. For your example, the outcome is that any *Match* with a win will be ranked higher than a tie/loss, even if the TBP1 is better in a *Match* that results in a loss (0 RP). It is always more beneficial to have the higher RP than the higher TBP1. Please see section 5.1.1 in the Game Manual Part 1 for a detailed description of averages, and section 5.2 for League Meet and Tournament Rankings.

( Asked by **5155** answered Jan 25th 24 )

## Q291 GS03 Interference Caused By Team Prop

**Q:** During auto, Team 1234 has a Team Prop that is a ball, and is within specifications of all TE rules. However, it rolls into the opposing alliance's side consistently in most matches and often collides and disrupts the other alliance's auto. Would this be in violation of , even though it is not the robot itself from Team 1234? Specifically, I am asking if a team prop were to cross into Tiles D, E, or F (and came from A, B, or C), would that be a penalty under , regardless of intent?

**A:** We believe !Q173 answers your question. If it does not, please rephrase your question and resubmit. **\*\*Note:\*\*** The *\*Robot's\** intent does not affect the answers in !Q173.

( Asked by **5155** answered Jan 23rd 24 )

## Q292 Limelight Smart Camera FTC legal?

**Q:** Is the Limelight camera FTC legal? We purchased a Limelight for our FRC bot, but then we got to wondering if... We checked the Legal and Illegal parts list and found no answer. We checked Chief Delphi and there are many different and conflicting answers. So FIRST, what's the official answer? Thank you, ROBOhana #16764

**A:** No, the LimeLight Vision Camera is not legal for use in 2023-2024 competition season. User-Programmable devices, including Vision Cameras and Vision Sensors, are not allowed.

( Asked by **16764** answered Feb 1st 24 )

## Q293 Follow Up On Q289

**Q:** Could there be a change in next year's manual to fix the confusion between "end of period" defined as "start of the sound" in the definitions & G20.b saying that it doesn't count if not started before "end of period"?

**A:** Addressing the issues in order: 1. Suggestions for future seasons should be emailed to [firsttechchallenge@firstinspires.org] (mailto:firsttechchallenge@firstinspires.org) per Appendix A in Game Manual Part 2. 2. There is no conflict in the Game Manual Part 2 between the definition of \*End of Period\* and rule G20b. The definition of \*End of Period\* describes when a period ends. Rule G20.b addresses \*Robot\* actions that occur at the defined \*End of Period\* event. Also, the statement in the \*Team's\* post that rule G20.b states that "it doesn't count if not started before "end of period" is the exact opposite of the rule's description in the game manual. The referenced defined term and rule in Game Manual Part 2 are shown below for reference. The definition of \*End of Period\* is: "The moment when the \*Match\* timer reaches 2:00 for the \*Autonomous Period\* or 0:00 for the \*Driver-Control Period\* and which coincides with the start of the sound that designates the \*End of the Period\*." Rule G20.b states: "\*\*Scoring\* achievements that were started (unless disallowed by Game-Specific rules) before the \*End of the Period\* are eligible to be counted as \*Scored\*." Rule G20.b states that \*Scoring\* achievements that were started before the \*End of the Period\* \*\*are eligible\*\* to be counted as \*Scored\*.

( Asked by 5155 answered Jan 25th 24 )

## Q294 Follow Up On @291

**Q:** I apologize I wasn't clear enough. Let me present a situation: a team prop is displaced to the other alliance's side and hits a robot on the other alliance. The penalty is a major (30 points). However, an individual robot can score 50+ points during auto. Regardless of intent, this can cause a huge disruption to the other team and a team could potentially play this off as an accident. This event occurred almost every match in our meet and the referee said it probably is not their intent.

**A:** We believe !Q173 and !Q291 answers your question. Concerning the reference to "intent", please revisit !Q291, the \*Robot's\* intent \*\*does not affect\*\* how the referee applies rule GS03.a to gameplay. \*\*Note:\*\* At the discretion of the Head Referee, strategic intentional violation of a rule is addressed by applying the egregious behavior rule (G30) consequences.

( Asked by 5155 answered Feb 8th 24 )

## Q295 Bump white pixels from the stack into opponent wing

**Q:** Q1: Is it legal for a robot to push some white pixels from a pixel stack into the opponent's wing? Q2: Will these white pixels count towards the 6 total pixels allowed in the wing at any time?

**A:** A1: No, each \*Pixel\* moved into the opposing \*Alliance's Wing\* will receive a \*Major Penalty\* per rule G29. Application of GS05.a, GS09.b, and GS10 consequences will also apply for certain gameplay scenarios. A2: Yes, however the opposing \*Alliance\* has rule G03 protections. For example, if a red \*Alliance Robot\* causes the blue \*Alliance Wing\* to contain seven (7) \*Pixels\*, the blue \*Alliance\* does not receive rule GS09.d \*Penalty\* points for the excess \*Pixel\*. The blue \*Alliance Robot\* and/or \*Human Player\* may not add \*Pixels\* to their \*Wing\* until the \*Wing's Pixel\* count is less than six (6).

( Asked by 23226 answered Jan 25th 24 )

## Q296 Is plowing through the pixel stacks considered propelling and legal?

**Q:** A robot intentionally plows through the 6 pixel stacks so it will be harder for certain types of robot, such as those picking up two pixels from a stack. Is this considered legal?

**A:** Intentionally \*Plowing\* is not a possible gameplay scenario because the definition of \*Plowing\* in Game Manual Part 2 states: "\*\*Inadvertent\* contact with \*Game Elements\* while in the path of the \*Robot\* moving about the \*Playing Field\* that provides no additional advantages beyond field mobility." The scenario described in the question is intentional, not \*Inadvertent\*, and the \*Robot's\* actions provide advantages beyond field mobility. Rephrasing the scenario to: A \*Robot\* intentionally knocks over \*Pixel\* stacks in a manner that is allowed by rule GS05.c.i so it will be harder for certain types of \*Robots\*, such as those picking up two \*Pixels\* from a stack. Is this considered legal? Yes, the \*Robot's\* actions in this scenario are allowed, provided that no other rule is violated.

( Asked by 23226 answered Jan 25th 24 )

## Q297 Wing angle of drone configuration

**Q:** What angle do the wings have to be from the fuselage of a drone to be eligible? Here's a link to some examples of different angles.  
[https://drive.google.com/drive/folders/1-K\\_rHxm0dtCXJkdZDs6DopqzeChEMGrn](https://drive.google.com/drive/folders/1-K_rHxm0dtCXJkdZDs6DopqzeChEMGrn)

**A:** There is no specific wing angle that a Drone must meet to be legal. The intent is that the wing has an aerodynamic influence on the flight path of the Drone and that it is visibly a "paper airplane". Wings that are tight against the fuselage turn the Drone into a dart, which is not allowed. If there is a question at Inspection, the Inspector may ask the team to demonstrate the Drone in flight.

( Asked by 5199 answered Feb 8th 24 )

## Q298 Oak-1 Lite USB C connection

**Q:** The Legal and Illegal Parts list shows the Oak-1 Lite in the Vision Sensor category. I want to confirm that using the Oak-1 Lite along with a Vision Camera such as the Logitech C270 is allowed. Out of the box the Oak-1 Lite connects using a USB C connection. Therefore, during inspection it would appear as if there are two 'usb cameras' plugged in. If the Oak USB C connection is allowed, I hope this question sets precedent for inspectors to know that not all vision sensors connect via I2C.

**A:** No, the Oak-1 Lite Camera is not legal for use in 2023-2024 competition season. User-Programmable devices, including Vision Cameras and Vision Sensors, are not allowed.

( Asked by 19367 answered Feb 1st 24 )

## Q299 Mentor definition for Connect Award

**Q:** Q1: What interactions qualify someone as a mentor for the Connect Award? Q2: More specifically, must interactions with professional mentors follow the same standards of repeated communication as team to team mentorship (GM1 appendix F)?

**A:** For the Connect Award, a mentor may be someone who assists a team with their robot function and/or design (software, programming, machining parts, etc.), they may assist with project management to help the team with organizational skills. These are just a few quick examples. The specific requirement is that the adult coach or mentor has provided guidance and support to a team over the course of a season, and demonstrates to the team gracious professionalism in their demeanor and behavior. There are no additional guidelines for this award.

( Asked by **12087** answered Feb 15th 24 )

## Q300 Robot caused some white pixels to fall into opponent's wing during autonomous

**Q:** If our robot, during autonomous, accidentally causes some white pixels to fall into the opponent's wing, will this be penalized?

**A:** Yes, each \*Pixel\* moved into the opposing \*Alliance's Wing\* will receive a \*Major Penalty\* per rule G29. Application of GS03, GS05.a, GS09.b, and GS10 consequences will also apply for certain gameplay scenarios.

( Asked by **23226** answered Jan 29th 24 )

## Q301 Is it allowed to have two different sets of team props?

**Q:** Our team found that our object detection code works differently under different lighting conditions. One set of props work better for certain lighting conditions and another set of props work better for another lighting conditions. Since we don't know what lighting conditions it will be at the comp, can we bring two sets of props for inspection?

**A:** Yes, Teams may bring multiple Props or Drones to an Event for inspection.

( Asked by **23226** answered Feb 1st 24 )

## Q302 Autonomous selector switch

**Q:** We have 6 different autonomous programs currently. We need to account for Blue vs red side. We have different ones based on our alliance partners capability. Is it legal to add a selector switch, rotary or other on the robot so we can have one Autonomous program but we select which program we want to run before the match? We understand the switch must be set BEFORE match play and cannot be touched after the randomized dice are chosen. We will already know the program we want to run.

**A:** Yes. Sensors (including switches) that are compatible with RE11 are allowed to be used on a robot. We also believe the answer to !Q278 is also related to your question from a software-centric perspective.

( Asked by **24488** answered Feb 1st 24 )

## Q303 Robot placement on the playing field

**Q:** Q1: Can I adjust the location of the robot when it is placed on the field and before the match whistle starts or not? Q2: The point is, Can I never move it after putting it on the field, even minutes before the game and it's considered a penalty?"

**A:** The answers that you seek are found by reading the pre-\*Match\* set up description in section 4.4.1 and rules G12, G13, G14, G15, and GS02 in Game Manual Part 2. A1: Yes, with the following constraints. The \*Drive Team\* may adjust the \*Robot's\* location on the \*Playing Field\* during pre-\*Match\* set up per section 4.4.1 and rules G12, G13, G14, G15 in Game Manual Part 2 provided that their set up procedures do not delay the start of a \*Match\*. \*Drive Teams\* are not allowed to touch their \*Robots\* nor their \*Driver Stations\* after the referee announces that set up is complete per rule GS02. A2: See A1 for the answer.

( Asked by **21417** answered Jan 29th 24 )

## Q304 Team Prop Paper Cylinder

**Q:** Can a team prop be a red or blue paper cylinder? Specifically, the top and bottom of the cylinder are open, and not solid (can see through from one side out the other).

**A:** Yes, providing it meets the other parameters such as color, size, and Team number. Be aware that a paper cylinder is very fragile and it may get damaged during normal gameplay if a Robot runs into it. Plan to bring plenty of spare to an event.

( Asked by **12126** answered Feb 1st 24 )

## Q305 One-Way Microphone for Video

**Q:** If the audio is being used for entertainment purposes only, is the use of one-way microphones allowed for drive team members? For example, are we allowed to put wireless microphones on our drive team that a camera is recording from the stands? In section 3.5 C22 it goes over competition rules in relation to two-way communication being not legal, however but it does not state whether or not one-way communication is allowed for video/entertainment purposes.

**A:** The short answer is no. Regardless of the intent of any recorded audio, C10, C12, and C22 still apply.

( Asked by **10173** answered Feb 1st 24 )

## Q306 Team Prop interference

**Q:** Several teams were warned that if a team prop came in contact with an opposing alliance's robot during autonomous they would receive a major. I assume this is an interpretation of GS03. If the prop is not designed to interfere with another robot would it not fall under Inadvertent and Inconsequential – Robot actions that violate a rule may be ruled at the referee's discretion to be Inconsequential and Inadvertent and will not be Penalized?

**A:** We believe !Q173 answers your question. If it does not, please rephrase your question and resubmit. A \*Major Penalty\* will be assessed if the \*Robot\* or the relocated \*Team Prop\* In the opposing \*Alliance's\* half of the \*Playing Field\* impacts or impedes the opposing \*Alliance's Autonomous Period Scoring\* actions per rule GS03.a. **\*\*Note:\*\*** The \*Team Prop\* design does not affect the application of rule GS03.

( Asked by 20182 answered Jan 30th 24 )

## Q307 Bringing additional mechanisms or parts of robots for judging

**Q:** Game manual 1 states that "Each registered Team may enter only one Robot". Is it legal for teams to bring additional parts, mechanisms, or robots to show judges their iteration process, so long as they only enter one robot in the competition?

**A:** If the team would like to show unique parts or mechanisms of the robot, and those mechanisms are not being used at the current competition, those may be brought to be used as a visual aide. Otherwise, teams can use pictures, video, or animations to show past iterations of their robot without needing to bring a secondary robot.

( Asked by 21336 answered Feb 20th 24 )

## Q308 Robot Inspection

**Q:** 1. In reference to the part W44609 TETRIX® MAX Gripper Arm Kit from legal and illegal parts, the robot inspectors referred to rule RM02 Commercial Off-The-Shelf Parts. Our claw uses one gear, one bracket, and the 3 arm linkages from the kit on the website <https://www.idesignsol.ca/products/claw-kit-276-2212>. However, our claw has a custom 3-d printed second gear, second bracket, one custom arm linkage, claw tips and servo mount. Our claw works through the two gears powered by one servo.....

**A:** In general, a 100% team manufactured component/assembly is allowed, even if it is an exact copy of an illegal COTS component. If any portion of the component/assembly is part of an illegal COTS kit (i.e., not manufactured by the team), the entire component/assembly is not allowed. Of course, using general purpose fasteners (e.g., screws, nuts, bolts, etc.) from an illegal kit is allowed.

( Asked by 9990 answered Feb 8th 24 )

## Q309 Robot Inspection continued from number 1

**Q:** 2. Our claw works such that it is connected to one gear that spins another gear. As this is one input = one output. Please respond if this is legal or if you need more information regarding this or with a way we can send a photo showing how our mechanism works. Coach Ray Alford Team: Robo Vikings #9990

**A:** We believe Q308 answers your question. If not, please re-submit with additional detail.

( Asked by 9990 answered Feb 8th 24 )

## Q310 Bringing an additional robot to competition solely for judging demonstration purposes

**Q:** According to , each registered team is only allowed to bring one robot to a competition. However, our team would like to bring an additional (completely different) robot solely for the purpose of demonstrating during judging with zero intention of competing with it. Q1: Are we allowed to do this? Under what conditions of the robot would we be able to do this? Q2: If the answer to Q1 is no, is there any way we'd still be able to bring parts of our robot to the competition?

**A:** A team cannot bring an entire second robot to a competition. If the team would like to show unique parts or mechanisms of the robot, and those mechanisms are not being used at the current competition, those may be brought to be used as a visual aide. Otherwise, teams can use pictures, video, or animations to show past iterations of their robot without needing to bringing a secondary robot.

( Asked by 11138 answered Feb 8th 24 )

## Q312 Clarification PWM Signal wire may be relieved from Q85, RE14

**Q:** The PWM wire (of the 3 wires) is a pulse width (of ~800-2200 microsecond) carrying wire and not current carrying. Teams can optimize and reduce the wire size to better innovate. Manufacturers utilize the same gauge for PWM as Power for convenience and not necessity, lower gauges will not create negative impact or safety concern and increase innovation. Team design and reliability is the proof. Can FIRST exempt PWM signal wires and allow =>32awg.

**A:** The short answer is No. For reasons of safety, all wires in the PWM wiring bundle must be no less than 22AWG as referenced in !Q85. A simple inversion of the connector where it plugs into the control/expansion hubs would result in the ground and signal lines being swapped and the undersized signal line now needing to carry the full current of the servo.

( Asked by 3763 answered Feb 7th 24 )

## Q313 Clarification of intaking from white pixel stacks in autonomous - shifted pixels

**Q:** Alliance side only, no interference issues suggested. Q1: If we intake two pixels but knock some off the line (see <https://1drv.ms/i/s!AloUaG8oc-6lkEW311AqU6HEMRgO?e=f5aV6U> for result after intaking two pixels), is there a penalty? Q112 states no penalty "while picking them". Q2: Would the strategy used in <https://youtu.be/Jqu6HLafB4k> and/or <https://youtu.be/4BeJTIZXXf0> result in penalties (only intake portion)? There is lots of discussion that Q112 allows this strategy on (unofficial) forums.

**A:** The answers that you seek are found by reading rule GS05 in Game Manual Part 2. There are also several posts to this Q&A forum that address related scenarios that are found by searching for the word "stack." Please note that watching gameplay video provides a limited view of the \*Robot's\* actions and their outcomes. A referee watching gameplay may notice a rule violation that is not visible in a video. A1: No, per rule GS05.c.i. A2: If the \*Robots\* in the videos \*Possess\* two or fewer \*Pixels\*, their actions applied to a single \*Pixel Stack\* are allowed per rule GS05.c.i. There are two other considerations if the \*Robot\* causes movement of \*Pixels\* in an adjacent \*Pixel Stack\*: Example 1: If as part of the \*Robot's\* actions, \*Pixels\* in an adjacent \*Pixel Stack\* remain stacked and are moved completely off of their white tape line, rule GS05.a is violated per rule GS05.c.ii. Example 2: If as part of the \*Robot's\* actions, \*Pixels\* in an adjacent \*Pixel Stack\* are knocked off and are no longer stacked, there is no \*Penalty\* per rule GS05.c.i.

( Asked by **10138** answered Feb 1st 24 )

### Q314 Simple LED lights

**Q:** Confirming that simple straw-hat LEDs are again acceptable for use this year (they were last year) when used with a passive current limiting resistor as recommended by the supplier. The LED's use would follow .

**A:** Under current rules, this combination of a resistor with an LED would be considered as a custom circuit and not allowed per RE16

( Asked by **10138** answered Feb 8th 24 )

### Q315 Launching Drone when robot is suspended from the truss

**Q:** Does the drone need to go over the truss if it is launched when the robot is suspended on the truss?

**A:** We believe !Q8 answers your question. If it does not, please rephrase your question and resubmit.

( Asked by **14212** answered Feb 5th 24 )

### Q316 Can the drive team use LEDs to communicate to the Human Player

**Q:** We were discussing using colored LEDs powered by a microprocessor to communicate between a Drive Team Coach and the Human Player. The Drive Team Coach would be in possession of both the controls to change the color and the LEDs. The intent of rule G11 seems to be to prevent wireless communication by members of the drive team. While this is still "electronic communication", the result is essentially the same as holding up colored pieces of paper to indicate pixel colors. Would this be allowed?

**A:** A \*Drive Team\* may not use LEDs powered by a microprocessor during a \*Match\*. The intent of Rule G11 is to prohibit the \*Drive Team\* from communicating with electrically powered devices that are not specifically allowed by a rule. For example, the \*Driver Station\* rules allow specific electronics.

( Asked by **21495** answered Feb 7th 24 )

### Q317 Vision Sensors Legality

**Q:** Q298 asked about the legality of Oak Lite 1 vision sensor. What about the other sensors listed as legal on page 11 of the legal-illegal parts list under vision sensors? The HuskyLens and PixyCam are also shown with the Oak Lite 1 as options. Additionally the HuskyLens has supported documentation in the SDK, as referenced in Game manual 1, section 7.2.1.

**A:** You are correct, the image of the Oak-1 Lite was included as a mistake. We apologize for this error. The HuskyLens and PixyCam/Pixy2 meet all requirements for a Vision Sensor.

( Asked by **20077** answered Feb 8th 24 )

### Q318 Anti-Static Paint

**Q:** Regarding Q269, it talks about the ability to use staticide on robots. Is it allowed to be able to use Anti-Static Paint? It is not clearly stated as to whether or not it is legal, and we want to verify. It would be on our side plates and it would be dry by comp.

**A:** RM03 states, "Allowed materials and legal COTS parts may be modified (drilled, cut, painted, etc.), as long as no other rules are violated." FIRST Tech Challenge does not restrict the kinds of paints used, except those prohibited by RG01 (containing hazardous materials like lead, cause a mess on the field, etc...). When painting COTS parts/materials, DO NOT paint over any identifying markers (labels, serial numbers, etc) that inspectors may need to use to identify the components being painted. Teams should be aware that these paints may have different handling precautions over generic paints and that the manufacturer's recommendations and the MSD sheet should be consulted before using.

( Asked by **10355** answered Feb 8th 24 )

### Q319 Robot alignment

**Q:** Our team is considering using a tape measure or something like that attached to our robot for the drive team to align the robot on the field before the match start. Q1: Is this legal?

**A:** We believe !Q276 answers your question. If it does not, please rephrase your question and resubmit. Rule G15 allows for alignment devices that are part of the \*Robot\*. Therefore, a tape measure that is part of the \*Robot\*, fits into the 18" starting volume, and is not powered is legal.

( Asked by **21417** answered Feb 5th 24 )

### Q320 Team Prop with multiple shades

**Q:** According to , a team prop can include multiple shades of the same color. So, to clarify, does this mean that a red alliance prop can be pink with red dots on them, and it would be legal, or would it need to be entirely one shade?

**A:** Multiple shades are allowed but if the dots are intended to be used as fiducial marks they would be illegal per rule TE03.

( Asked by **19411** answered Feb 8th 24 )

### Q321 Blocking access to the wing further clarification

**Q:** Is blue alliance robot intaking from the stacks and located in tile B1 and B2 who's not actively and for an extended period blocking all access paths to the wing considered to be blocking as per GS09?

**A:** No, provided that the path from the back half of the \*Playing Field\* towards the audience through the \*Tile\* A3 \*Truss\* segment and \*Tiles\* A1 and A2 is not obstructed. **Note:** During the \*End Game\*, rule GS06.f will apply to certain scenarios.

( Asked by **19071** answered Feb 7th 24 )

## Q322 Additional signage on audience wall distracting vision sensors?

**Q:** At our recent event, competition fields had 8.5x11 signs on the transparent audience wall identifying "Field 1"/"Field 2". The backs of the signs create a large white area visible through the wall that can confuse Robot Vision Sensors detecting white game elements (pixels/white tape). Are the signs "allowed field variance"? We recognize that other white objects might be visible through the alliance wall (and robots should allow for this); our question is specific to directly-attached signs.

**A:** Event Personnel, nor teams, should not place signs on the field wall as it may be disruptive to robot sensors on the field. Other ways to identify the field (Field 1, Field 2, etc.) should be used.

( Asked by **7172** answered Feb 8th 24 )

## Q323 Drone Starting Position

**Q:** Is the drone allowed to start a match (while on the robot) with its tip on top of the playing field wall during set up initialization (while it is loaded onto the launching mechanism)?

**A:** Yes, provided that the \*Drone\* does not extend \*Outside\* the \*Playing Field Perimeter\* per the orange box in rule S02. **Note:** See the definitions of \*Playing Field Perimeter\* and \*Outside\* for a full understanding of how to apply rule S02 to this \*Robot\* set up scenario.

( Asked by **18766** answered Feb 7th 24 )

## Q324 Sister Team Robot at States

**Q:** I know this violates the spirit of rule 7, but I'm looking for definitive authority to appease those who disagree. Can a team that advances to the State Championship use a Robot built by a team that did not advance? Rule 7.1 states "A FIRST Tech Challenge Robot is a remotely operated vehicle designed and built by a registered FIRST Tech Challenge Team..." It does not specifically state that the "registered FIRST Tech Challenge Team" needs to be the same team that built the robot. Any guidance?

**A:** This is not legal per rule C05 "One Robot Per Team", part d. - "It is against this rule to use a Robot built by another Team".

( Asked by **9986** answered Feb 8th 24 )

## Q325 Using Motor Port to Power Control/Expansion Hub

**Q:** The male XT30 connector on my Control Hub is not making a reliable connection any more. I read on an online forum a recommendation to instead use an empty motor port - instead of plugging into the XT30 to power my Control Hub, I could cut/splice a power and motor cable together to instead provide power directly into a motor port to power my Hub. Is this safe/legal?

**A:** Absolutely not. Doing so can irreversibly damage your Control Hub and can provide an overall unsafe 12V power system on the robot. The only safe and legal way to power the Control Hub or Expansion Hub is through the XT30 ports on the hubs. For recommendations and a more thorough explanation, see [this ftc-community forum post](https://ftc-community.firstinspires.org/t/using-motor-port-to- power-control-expansion-hub/1026).

( Asked by **12789** answered Feb 8th 24 )

## Q326 Is it legal to shoot the pixel on the ground and pixel moves on ground by momentum?

**Q:** If a robot has some way to shoot a pixel to move on the ground by momentum (after pixel leaves the robot), to score in the backstage, is that legal? Note that pixel moves on ground, not through air nor above the playing field floor. The definition of launch is "Propelling Game Elements through the air or water above the Playing Field Floor."

**A:** The answer that you seek is found by reading rule GS10 in Game Manual Part 2. No, rule GS10 states that \*Pixels\* may not be \*Propelled\*. The definition of \*Propelled\* in section 4.3 of Game Manual Part 2 is: "Giving \*Game Elements\* enough force such that they move independent of contact with the \*Robot\* or \*Human Player\*. Movement solely due to gravity is not \*Propelling\*, \*Launching\*, \*Rolling\*, and \*Sliding\* are forms of \*Propelling\*."

( Asked by **21229** answered Feb 12th 24 )

## Q327 Follow up to Q314 - Permissibility of passive components

**Q:** Following up to Q314: 1. Can the use of an LED be considered a sensor since the use of added passives is permitted by RE11.c (and some sensors can explicitly be used as light sources)? 2. Can direct wired LEDs with integrated resistors be used (these seem limited to 12V selection)? This puts us into a bind requiring adding Spark-mini's for something that was permitted last year under similar game manual wording. Hoping the intent is clear (simple indicators). Happy to discuss in forum too.

**A:** A1) No. Sensors can have integrated LEDs (e.g. beam-break sensors discussed in !Q159), but LEDs cannot alone be considered sensors. A2) Yes, [such products](https://www.revrobotics.com/rev-31-2010/) are [commonly used](https://www.adafruit.com/product/1757).

( Asked by **10138** answered Feb 14th 24 )

## Q328 Q320 followup - fiducial markers on team prop

**Q:** In your response, you mentioned how banned fiducial markers. My question is how you would define fiducial markers? We detect the dots on our team prop by using Hough circle transforms, and they don't look like any of the examples of fiducial markers given (April Tags, QR codes, etc). Since it is just a line of 3 dots, would detecting those as our prop be legal?

**A:** Fiducial Markers are objects or patterns intentionally placed in a scene to establish the identity of the scene or objects within the scene. If you want to detect features of the Team Prop, that is fine but if you want to detect something you put on a Team Prop because you can't detect the Team Prop without it, then that's a fiducial. As such, your dots are perfect examples of fiducials.

( Asked by **19411** answered Feb 18th 24 )

## Q329 Xbox Elite Series 2

**Q:** Can you clarify if the Xbox Elite Series 2 controller is legal? It's not specifically listed in the legal parts list, but could fall under the Xbox 360 listed. This one is bluetooth capable, but we would use it via a wire instead of bluetooth.

**A:** No, the Xbox 360 Wired Controller is the only Xbox branded controller currently supported.

( Asked by **21485** answered Feb 14th 24 )

## Q330 Legal Grounding Straps

**Q:** Is the Andymark Resistive Grounding Strap (am-4648, <https://www.andymark.com/products/resistive-grounding-strap>) a legal grounding strap for use on the robot as per RE14k? It has identical connectors on both ends, the same resistor rating, length, and wire gauge.

**A:** No, the [AndyMark Resistive Grounding Strap (am-4648)](<https://www.andymark.com/products/resistive-grounding-strap>) is not a legal grounding strap for the 2023-2024 CENTERSTAGE presented by RTX season. Only the [REV Resistive Grounding Strap (REV-31-1269)](<https://www.revrobotics.com/rev-31-1269/>) is legal this season.

( Asked by **3507** answered Feb 13th 24 )

## Q331 Can the teams and event organizers test the main playing field by using autonomous opmode?

**Q:** Our auto Opmode relies on the accurate detection of April tags on the backboards. For the first few matches, the red/blue alliance backboards were swapped, therefore altering the order of the April tags. This unforeseen issue led to a failure of our autonomous routine, affecting our ranking in the league. Our robot worked on the practice field, but we couldn't test it on the main field due to current rules. Therefore, we are suggesting a test during the field inspection.

**A:** We apologize that this mix-up impacted your team, as well as other teams at your event. FIRST Tech Challenge volunteers strive to ensure that teams have the best experience possible. Where field inspections take place is up to the tournament director. There are multiple factors that play into where inspections take place (either practice or competition fields) including timing of event setup, logistics of the location of pits to the designated inspection location, etc. If a team notices an error in field setup, it is perfectly acceptable, and encouraged, for the team to get the Head Referee or Field Technical Advisor involved. If the error on the field is not discovered until after match play has begun, the Head Referee and/or FTA should be notified to fix the field. It is up to the discretion of the Head Referee to determine if matches should be replayed.

( Asked by **14969** answered Feb 15th 24 )

## Q332 Damage to field causes other alliance movement issues

**Q:** Q1: If a robot damages the truss in a way that distorts the stage door (without the robot touching the stage door) and causes an opposing alliance robot to get stuck while traveling under the stage door is rule GS07.b or GS07.c violated? Q2: If this happens is this considered major field damage? Q3: What should the stuck robot do?

**A:** A1: No, rules GS07.b and GS07.c are intended to address a \*Robot\* that directly prevents the \*Stage Door\* from operating normally or disrupting the transit of a opposing \*Alliance Robot\*. A2: Rule S01 applies to this gameplay scenario. The magnitude of the consequence applied to the offending \*Robot\* depends on the severity of the \*Playing Field\* damage. For example, damage that requires significant repair and/or delays subsequent \*Match\* play is likely to escalate to a \*Red Card\*. Q3: The \*Drive Team\* for the stuck \*Robot\* should attempt to free their \*Robot\* from the \*Stage Door\*. If assistance is needed, ask the \*Alliance Partner\* for help. If the stuck \*Robot\* is not able to free itself from the \*Stage Door\*, notify a \*Referee\* that the \*Robot\* is stuck and not able to continue with gameplay. \*\*Note:\*\* At the discretion of the head referee, the \*Match\* replay rule (G09) may apply to this scenario if the \*Playing Field\* damage was likely to have impacted which \*Alliance\* won the \*Match\*,

( Asked by **7078** answered Feb 14th 24 )

## Q333 Hanging on opposing alliance rigging

**Q:** Q1: During the endgame if a robot suspends on an opposing alliance rigging does this violate GS06.d? Q2: Even if the correct alliance does not engage with the rigging (to prevent touching a hanging robot)? Q3: How close must the correct robot be to show that they are prevented from suspending by the opposing alliance?

**A:** A1: The \*Robot\* in this scenario has violated rules GS06.a and GS06.b. Rule GS06.d is not violated because the scenario does not involve an opposing \*Alliance Robot\*. A2: The referee watching gameplay will make the rule GS06.d determination if the \*Suspended Robot\* on the incorrect \*Rigging\* impedes or obstructs an opposing \*Alliance Robot\* from \*Suspending\* during the \*End Game\*. The opposing \*Alliance Robot\* is not required to engage with the \*Rigging\* nor touch the \*Suspended Robot\* to trigger a rule GS06.d violation. A3: A2 applies, plus there is no required minimum distance between \*Robots\* that automatically triggers a rule GS06.d violation. The opposing \*Alliance Robot's\* actions should be obvious and unambiguous to signal that their intent to \*Suspend\* is affected by the \*Robot\* that is \*Suspended\* on the incorrect \*Rigging\*.

( Asked by **7078** answered Feb 14th 24 )

## Q334 Blocking wing by stuck robot

**Q:** During the driver-controlled period, if a robot stops moving in front of (not in) the opposing alliances wing creating a situation that the only way the opposing alliance can get in the wing is to push the non moving robot into the wing, would this be a violation of GS09.b. Q2: Would the pushing robot in this case violate G03? Q3: If the non moving robot is disconnected and non functioning does this change the answer?

**A:** A1: If we understand the scenario correctly, a red \*Alliance Robot\* does not move, it has not been declared \*Disabled\* by a referee, and it is \*Blocking\* a blue \*Alliance Robot\* from accessing the blue \*Alliance Wing\*. Rule GS09.b consequences apply to the red \*Alliance Robot\* while it is \*Outside\* the \*Wing\*. See A2 below for how to apply gameplay rules after the blue \*Alliance Robot\* pushes the red \*Alliance Robot\* into the \*Wing\*. A2: Rule G03 protections for the red \*Alliance Robot\* do not apply when the blue \*Alliance Robot\* pushes the red \*Alliance Robot\* into the \*Wing\* because rule GS09.b was already violated before the \*Robot\* was pushed into the \*Wing\*; rule GS09.b is continuously violated in this scenario. Rule GS09.b consequences should be applied to the red \*Alliance Robot\* for the entire time. A3: If we understand the new scenario correctly, the only change is that the red \*Alliance Robot\* is declared \*Disabled\* by a referee for the entire scenario. While \*Outside\* the \*Wing\*, rule G07 protects the \*Disabled\* red \*Alliance Robot\* from receiving \*Penalties\*. The \*Disabled\* red \*Alliance Robot\* that was pushed by the blue \*Alliance Robot\* into the \*Wing\* is protected by rule G03 and will not receive rule GS09.b \*Penalties\*.

( Asked by **7078** answered Feb 15th 24 )

## Q335 OpMode Annotation Requirement?

**Q:** We program in Blocks, and having a SINGLE OpMode program that provides Autonomous and Driver Control "behaviors" is more beneficial than multiple different OpModes (gamepad is used to select behavior during INIT). If our OpMode is annotated as a Teleop OpMode, we can still enable the 30-second autonomous timer using the timer selector switch, but the timer is not enabled by default. At our tournament, it was questioned if this is okay. Is an OpMode used in Auto required to be annotated as such?

**A:** There is no requirement that an autonomous opmode be annotated in the code as autonomous. There is a requirement that the 30-second timer be enabled for robots that are going to run an autonomous opmode during the autonomous period. Teams that do not annotate their autonomous opmodes should make sure to enable the 30-second timer for each match they participate in.

( Asked by **12789** answered Feb 29th 24 )

## Q336 Acceptable Wire Gauge for Custom Servo Cables

**Q:** We are looking to create a custom servo extension cable for our slide. Following rule 14.i.iii, would we be allowed to use a 3-wire 18 AWG multi-conductor coiled cable to create a custom servo extension? Is it acceptable to solder on 22AWG servo extension cables to the bare ends with heat shrink and strain relief to create the cable? The wire would have 22AWG -> 18AWG -> 22 AWG. Additionally, could we use a 4-wire multi conductor and have two servos share the +5V and GND wires?

**A:** The use of 18AWG wire to make servo extensions fits within the guidance for servo wire sizes and connections (i.e. 22AWG or larger, remember that smaller numbers equate to larger wire diameters). While it's legal to allow multiple servos to share servo power from the same servo port (e.g. using a servo "Y" cable or equivalent) it is not allowed to combine power across multiple servo ports - that could create potential overcurrent conditions and safety issues. If you do use a "Y" cable (or equivalent), be careful not to exceed the current rating of 22AWG wire; each servo will still attempt to pull its maximum rated current at stall, regardless of the size wire being used, and that current stacks for both servos.

( Asked by **20681** answered Feb 29th 24 )

## Q338 Shadowing robot blocking passing through truss or stage door G28 GS07

**Q:** Q1: Can a robot in the audience side of the truss shadow a robot in row 2 of tiles to prevent a robot from entering the audience side? Scenario: Blue alliance robot is passing through truss at Tile B3 and Red alliance robot moves to B2 to play defense. Blue then moves to tile C3 then D3 to move under stage door to gain access to the audience side. Red alliance bot then moves to tiles C2 and D2 shadowing the Blue Bot. Is this defense strategy allowed? Q2: Does above scenario violate G28 or GS07?

**A:** The answers that you seek are found by reading the definition of \*Block/Blocking\* and rules G28 and GS07 in Game Manual Part 2. A1: The red \*Alliance Robot\* in this scenario is violating rule G28. Rule GS07.c will come into play if \*Stage Door\* transit is affected. Keep in mind that violations of rule GS07.c are addressed per rule G28. A2: See A1 for the answer.

( Asked by **14374** answered Feb 26th 24 )

## Q339 Is a robot disabled for losing an alliance marker?

**Q:** If one of a robot's alliance marker's falls off during a match from a collision with the field or another robot, we have been told that the robot needs to be immediately disabled. Is this correct, as I have been unable to find this in the rules?

**A:** A \*Robot\* should not be declared \*Disabled\* by a \*Referee\* solely for its \*Alliance\* Marker falling off.

( Asked by **18450** answered Feb 26th 24 )

## Q340 Applying rule G10 during the Autonomous Period.

**Q:** Q1: Are there any guidelines to what is considered inconsequential by rule G10? Q2: Should de-scoring opponents pixels ever be deemed inconsequential? Q3: Should GS03 ever be over-ruled by G10 if the robot being interfered with during autonomous is still moving and attempting to score autonomous points?

**A:** A1: Referees use the definition of \*Inconsequential\* in section 4.3 of Game Manual Part when applying rule G10. For the CENTERSTAGE game, an outcome that does not influence \*Scoring\* or gameplay is \*Inconsequential\*. A2: Per the definition of \*Inconsequential\* in section 4.3 of Game Manual Part 2, de-scoring an opponent's \*Pixel\* is not \*Inconsequential\*. A3: We are not able to absolutely comment on this gameplay scenario. The vast majority of \*Interference\* scenarios during the \*Autonomous\* Period that we can imagine should not be eligible for a rule G10 override of rule GS03. However, we can think of a few examples where a referee may consider applying rule G10. For example, open field \*Robot\* contact away from any scoring or \*Pixel\* collection areas that occurs very near the end of the \*Autonomous\* Period could be considered by the referee as qualifying for a rule G10 override of rule GS03.

( Asked by **18450** answered Feb 29th 24 )

### Q341 Crossing a opposing Alliance's truss during Driver-Control period

**Q:** Can the Red Alliance cross over to the Blue Alliance side and go under their Blue Alliance truss during the Driver-Control Period to get to the Red Alliance Wing?

**A:** Yes, the \*Robot's\* path of travel described in the question is allowed. Keep in mind that rules GS06.d, GS06.f, and G28 may apply depending on the gameplay scenario.

( Asked by **13714** answered Mar 4th 24 )

### Q342 Collecting a purple pixel from a spike mark during the driver-controlled period.

**Q:** Purple pixels on the spike mark are scored at the end of the autonomous period. Is it allowed to collect them from the field during the driver-controlled period and score them on the backdrop? Is it allowed to take such pixels from the opposing alliance spike marks, or would that be considered as descoring?

**A:** We believe !Q47 Q2/A2 answers your question. If it does not, please rephrase your question and resubmit. Yes, a purple \*Pixel Scored On\* any \*Alliance's Spike Mark\* during the \*Autonomous Period\* is not subject to a descoring \*Penalty\* when it is moved \*Off\* of the \*Spike Mark\* by any \*Robot\* during the \*Driver-Controlled Period\*.

( Asked by **21656** answered Mar 4th 24 )

### Q343 Is there a weight specification for the team prop?

**Q:** Our team was doing a practice match with another team and there was a team prop that weighed 25 pounds, and we are wondering if this is allowed?

**A:** No, there is no weight requirement for the Team Prop. However, there is an expectation that Field Personnel can easily and safely move Team Props during Randomization. If the weight of the Prop causes an issue with the field reseters, the Team may not be eligible for the Auto bonus. Also, if the Prop causes an imprint in the Tile that Robots have to drive over, it will be considered field damage. A Team Prop this heavy would also constitute an immovable object on the field that will obstruct Robot travel and would be penalized per rule G29.

( Asked by **10544** answered Mar 7th 24 )

### Q344 Can an OpMode save things in a static context during pre-match?

**Q:** Can the drive team, before bringing the robot into the playing field, run a teleop OpMode that saves some configuration-info into a static context (f.e. boolean for red/blue alliance), and then bringing the robot into the field (without switching it off) and continuing the regular steps - choosing the required autonomous Opmode and running the init and so on...? (The intention for this is to create some setup parameters that the autonomous opmode will use)

**A:** Teams should not be transporting a powered robot. It's not directly declared as illegal to do so, but it is a safety risk and thus the safety rules demand the robot to be off. If teams want to store setup parameters, they should consider writing/reading files on the Control Hub filesystem. There's even an example program that uses custom myBlocks written in Java that makes reading and writing the filesystem accessible to blocks users here: [[https://ftc-docs.firstinspires.org/en/latest/programming\\_resources/shared/myblocks/rw\\_example/rw-example.html](https://ftc-docs.firstinspires.org/en/latest/programming_resources/shared/myblocks/rw_example/rw-example.html)]([https://ftc-docs.firstinspires.org/en/latest/programming\\_resources/shared/myblocks/rw\\_example/rw-example.html](https://ftc-docs.firstinspires.org/en/latest/programming_resources/shared/myblocks/rw_example/rw-example.html))

( Asked by **23422** answered Mar 7th 24 )

### Q345 Is the camouflage green PS4 controller allowed?

**Q:** On GM1-DS03 it says Sony DualShock 4 Wireless Controller for PS4 (ASIN # B01LWVX2RG) is legal. This ASIN refer to the jet black color. However, we have a Green Camouflage color with a different ASIN number (ASIN # B01MTKXP31). Is it legal for using it for competition? <https://drive.google.com/drive/mobile/folders/1Z5pcrXVh2vci3vFKjhvJsF0q3CRVpCBg>

**A:** Yes. The Amazon Standard Identification Number (ASIN) provided is merely a helpful breadcrumb to help you source a legal gamepad, and is not specifically a required identifier. The last line of DS03 provides the definitive answer to your question, "Different color gamepads are allowed provided they are the same model as the allowed gamepad."

( Asked by **6436** answered Mar 7th 24 )

### Q346 Placing pixels in the wing

**Q:** A human player is working on placing pixels in their wing. The pixels have broken the plane of the playing field wall, but have not yet been placed. At this point the human player recognizes that an alliance robot is coming to get pixels from the wing. Can the human player remove the pixels that not yet been placed so the robot can enter the wing without penalty or must they be placed before the alliance robot enters the wing?

**A:** Yes, the \*Human Player\* with the \*Pixels\* that have not been placed may back out of the \*Playing Field Perimeter\* without violating a rule.

( Asked by **20515** answered Mar 5th 24 )

### Q347 Penalties for autonomous collision descoring yellow pixels

**Q:** An alliance scores two yellow pixels correctly (per randomization) during autonomous. An opposing alliance robot then crosses the midline, collides with a parked robot, causing it to bump the backdrop, descoring the two yellow pixels. What should the penalties be in this case?

**A:** The \*Alliance\* that caused the descoring receives two \*Major Penalties\* (one \*Penalty\* per descored \*Pixel\*) for \*Interfering\* with the opposing \*Alliance's\* Randomization Task Scoring\* per rule GS03.b.

( Asked by **6547** answered Mar 7th 24 )

## Q348 Robot using yellow bars for bracing while suspending/clarification of Q94 & Q271

**Q:** A referee's interpretation of GS06.a was that although our robot was braced against the yellow bars for "stabilization" and off of the ground, if the yellow bars were removed the robot would touch the ground and our hang would therefore not be legal. Our interpretation is that the robot is still using a hook to suspend itself from the rigging and legally pivoting/stabilizing around the yellow bars. Which interpretation is correct?  
[https://drive.google.com/file/d/1JeeHBy\\_jh2MSIgK0O8AYhIHWNKnr10P5](https://drive.google.com/file/d/1JeeHBy_jh2MSIgK0O8AYhIHWNKnr10P5)

**A:** The \*Robot\* in the photo appears to receive impactful vertical support from its contact with the yellow bar. The \*Robot\* should not receive points for \*Suspending\* per rule GS06.a.

( Asked by **5356** answered Mar 7th 24 )

## Q349 Use fans to cool robot

**Q:** We are trying to plan a robot base for next year and are trying to figure out if we would be able to use off-the-shelf fans for a cooling system for the motors. Defines a servo as any motor with less than 6V, specifically allowing any servo that is compatible with the control hub only explicitly disallows closed gas devices, and doesn't mention fans Would an off-the-shelf fan be allowed by these rules?

**A:** No. COTS fans are not servos, and RE10 merely states that servos will only be provided 6V or less by the Control System. A "fan" in and of itself is not illegal, but it must use a legal actuator and follow all other rules (including safety rules).

( Asked by **9853** answered Mar 12th 24 )

## Q350 Cable Management for Viper Slider

**Q:** We are using a viper slider. We are wondering if the following cable would be legal to use for our servos that are part of the sliding system?  
<https://www.coilcablespecialist.com/22-awg-6-conductors-electronic-shielded-coil-cable-2206em0s.html>

**A:** In general it's not possible for us to blanket rule on the legality of a generic cable (with no connectors) because it's impossible for us to predict how you'll eventually be using that cable. This is especially true for multi-conductor cable bundles where there are even more considerations to make. When considering the legality of a multi-conductor cable used for powering/controlling servos, keep in mind these considerations: - If each conductor of the 22AWG cable bundle is 1:1 replacing a single conductor in an existing 22AWG servo cable bundle (6 conductors = 2 servo 3-wire bundles) then you will likely not run afoul of current carrying limits; be careful to read the cable specs to ensure the cable can handle the current load (2+ Amps for most servos). - RE14.f and RE14.i will need to be carefully considered, especially if you'll be crimping new 3-pin 0.1" servo connectors to the multi-conductor bundle ([colored heat shrink](<https://a.co/d/iYS8y4b>) does wonders). - Be sure to have documentation about the wire bundle conductors at inspection as highlighted by the orange box in RE14.i.iv.

( Asked by **23554** answered Mar 12th 24 )

## Q351 Pushing pixels in the other alliance's wing

**Q:** Each alliance has a wing and a stack of pixels next to the wing. Q1: If a robot pushes pixels from the top of the stack to the floor by a claw/robot body, and some of the pixels fall to the opposing alliance wing, is it a penalty? Q2: If by accident I try to pick them up but they go in the opposing alliance wing. Q3: Will it be possible to pick up pixels from the opposing alliance wing? Q4: Does the opposing alliance receive a penalty because they have more than 6 pixels in their wing?

**A:** A1: Yes, each \*Pixel\* moved into the opposing \*Alliance's Wing\* will receive a \*Major Penalty\* per rule G29. Application of GS05.a, GS09.b, and GS10 consequences will also apply for certain gameplay scenarios. A2: Same answer as A1. A3: No, per rule GS09.b. A4: No, the opposing \*Alliance\* is protected from \*Penalties\* per rule G03. For example, if a red \*Alliance Robot\* causes the blue \*Alliance Wing\* to contain seven (7) \*Pixels\*, the blue \*Alliance\* does not receive rule GS09.d \*Penalty\* points for the excess \*Pixel\*. The blue \*Alliance Robot\* and/or \*Human Player\* may not add \*Pixels\* to their \*Wing\* until the \*Wing's Pixel\* count is less than six (6).

( Asked by **22947** answered Mar 12th 24 )

## Q352 Clarification on Penalties Related to Rule GS05 Regarding Scoring Element Control

**Q:** Q1: If our robot accidentally pushes over our own stack of Pixels during the Autonomous period, causing it to move outside the white tape (at the boundary of the playing field), will this action incur a penalty? Our concern is specific to unintentional actions that do not provide a competitive advantage.

**A:** We believe !Q5, !Q13, and !Q201 answers your question. If they do not, please rephrase your question and resubmit. A1: No penalty, per rule GS05.c.i.

( Asked by **16417** answered Mar 21st 24 )

## Q353 Clarification on GS03 penalty quantity for Autonomous Interference

**Q:** In a recent tournament, early autonomous interference prevented cycling of white pixels and parking. One major penalty was applied. In this case and many possible others, the 1x major penalty was less than the potential lost autonomous points. Can the GDC propose a solution to the point advantage of a single major penalty (30 pts) vs preventing a high-scoring autonomous (45+ pts)? Please consider that showing intent (egregious behavior) vs an accidental mis-click or SW bug is likely unprovable.

**A:** First of all, the Game Design Committee understands your concern. All things considered, we feel that rule GS03 and its consequences provides a reasonable balance between the affect on gameplay and reparations. 1) The single GS03 \*Penalty\* applied is correct based on the limited description of the gameplay scenario. 2) Applying additional consequences based on what a \*Robot\* that was \*Interfered\* with might have done otherwise during the remainder of the \*Autonomous period\* is not possible. 3) You are correct, distinguishing between intent and an accidental miscue during the \*Autonomous Period\* is likely to be unprovable. 4) The Game Design Committee feels that rule GS03 violation consequences are fair to all parties in the vast majority of scenarios.

( Asked by **19746** answered Mar 28th 24 )

## Q354 GS05 - Moving pixel stack while collecting

8/3/25, 12:49 PM

## FTC Q&A Answers

**Q:** Rule GS05 states in part that moving a pixel stack completely off the white line is not allowed, but knocking it over is allowed. May a robot knock over (scatter) a pixel stack while it is collecting the bottom two pixels in the stack?

**A:** Yes, per rule GS05.a and GS05.c.i.

( Asked by **7393** answered Mar 28th 24 )