



GAPPS Robotics

2024-2025

Competition Rules and Scoring

Rev 1

Revision Number	Date Revised	Notes	color
0	1/26/2025	Initial	
1	1/27/2025	Fixed typo regarding shelf scoring	

General Terms and Definitions

Game Rules: Rules are divided into two sections: General rules and game rules. Game rules are specific to this year's game and playing field.

Playing Field: Defines the full range of field mats, start zones, field elements, support structures and any other part or areas deemed important to the game.

Play Area: Defines the area where the robot operates to score points. The play area will be a combination of physical assemblies and indicated areas that are a part of the playing field. Generally, only robots and referees are permitted to touch objects in the play area – not team members. See “In Play” and “Out of Play”.

Floor: The Playing Field sits on the floor. The floor is generally considered out of play, unless otherwise noted in the game rules.

Starting Zone: Whenever a robot is restarted (at the beginning or during a round), the robot must start from its designated starting zone (by color), with the robot sitting entirely behind the line that divides the starting zone from the field mat. Each starting zone's size and location is defined by that year's game rules.

Starting Gate: The PVC gate that can slide up and down at the end of the start zone. Each time a robot is started from the start zone, it must pass through the start gate. If the start gate is knocked off while the robot is leaving the start zone to enter the play area, the gate must be reset, and the robot must be immediately picked up and restarted from the start zone. This also includes if the robot gets stuck while attempting to exit the start gate.

If the robot has left the start zone and then gets stuck on the start gate, the team will need to use a token to recover the robot.

Scoring Zone: Any zone designated in the play area where the robot can score points, either using scoring elements or the robot itself.

Scoring Elements: Any object designated by the game rules that will score points when placed in scoring zones by the robot.

Scoring Process: Defines the actions a robot takes to score an element (or itself.) These typically include the movements of the robot to get into scoring position, the movements of an arm to score the element, and the movements of the robot to clear the scoring area.

Field Elements: Objects in the play area that the robot may interact with.

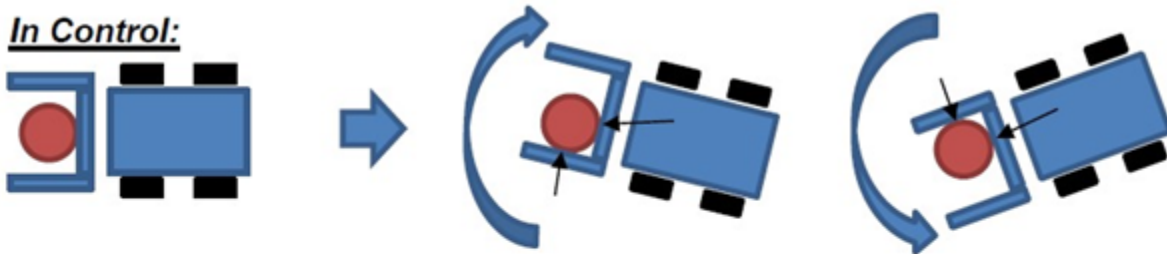
Wheel Base: Any part of the robot used to move the robots (may be wheels or treads). Used to determine when a robot is in a certain location.

In Play: Refers to the state of the robot, any detached robot parts, scoring elements, or field elements, relative to the field. A robot is considered “in play” when none of its wheels / treads are in contact with the floor. An element is considered “in play” when it has no contact with the floor. While “in play”, a robot or element may not be retrieved, except as permitted by the game rules.

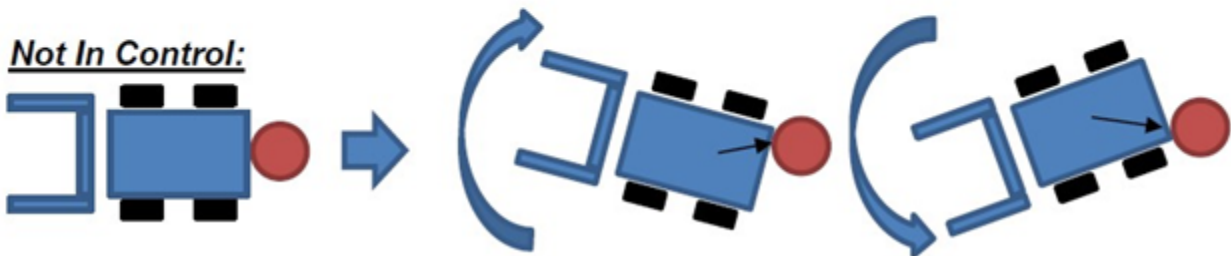
Out of Play: Opposite of “in play”. If a robot is not “in play”, it is considered “out of play”. A robot that is “out of play” may immediately be retrieved by its team and restarted from its start zone. Any scoring element UNDER CONTROL of the robot can also be retrieved, even if the element is not yet considered “out of play”. An element or detached robot part may be retrieved when it is “out of play” (such as, rolls off the mat and touches the floor).

In Control: Determines the state of an element when the robot is acting autonomously. A scoring element is considered under “control” of the robot if the robot can be turned 90° in either direction and with each turn, the scoring element touches the robot on two points. For example:

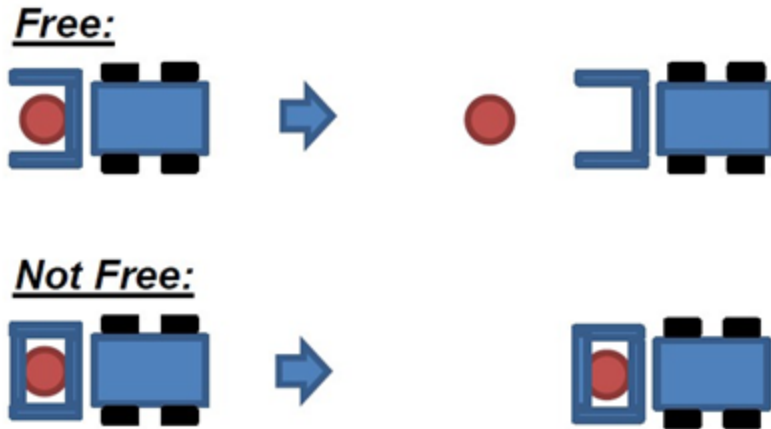
In Control:



Not In Control:



Free: Determines the state of an element when the robot is being retrieved from the play area. Free elements are left in the field. A scoring element is considered “free” if the robot can be moved in any single direction in the X-Y axis (not up) and the scoring element does not move with the robot. For example:



General Match Rules

1. A match: four autonomous robots competing simultaneously to earn the greatest number of points by the end of the last round. Points are earned by moving scoring elements into scoring zones, as defined by the game rules.
2. Each match is made up of multiple rounds. At the end of each round before the final round, the field is reset per the game rules and robots are returned to their starting zones. At the end of the final round, points are calculated per the game rules. A team's score for all matches is cumulative. At the end of the seeding matches (matches before the quarterfinals), every team's lowest scoring match will be removed. This does not apply to the quarterfinal matches or final match.
3. During the round, robots may be restarted from their start zone if they leave the playing field on their own ("out of play"), if the team requests the robot be "rescued" by the referee, or if they are "entangled" with by another robot (as defined by the game rules.)
4. Every time a robot is started from the team's start zone, the robot (and all loaded scoring elements) must start entirely behind the line dividing the start zone and the field mat. In addition, the robot must never knock off the starting zone gate. If either of these occur, the referee will require the team to collect their robot, reset the starting zone gate (if necessary), and try again.
5. The robot may be modified with attachments / detachments while outside or inside the starting box as long as it is out of play. While in the starting box, the robot may be loaded with scoring elements, as detailed in the game rules. The robot plus scoring elements must satisfy the restart requirements defined in Rule 4.
6. At the end of each round, robots are stopped (if necessary) and are returned to their teams. Any scoring elements that are "free" when the robot is removed from the field remain in the field and are handled as determined by the game rules. Any pieces that are not "free" are returned to the team with their robot.

7. Students are not permitted to enter or touch any element (or robot) considered “in play” at any time for any reason. If they need to have some interaction with the field or its elements, they must request the referee to assist them.

8. If a scoring element is pushed out of the play area during a round, it may be immediately retrieved and returned to the team’s start zone.

9. Teams start each match with several “Rescue tokens,” as determined by the game rules. If students wish to retrieve a robot (for any reason) while it is considered “in play”, they may request to have their robot retrieved by raising their rescue flag. Robot detachments are not considered part of the robot, and therefore, cannot be retrieved with Rescue Tokens. If the robot is not in contact with another robot, they must pay a token to the referee and ask the referee to retrieve their robot. If a team runs out of tokens, they may no longer request that their robot be retrieved while in play.

a. **Early Exit Rescue:** A team may choose to end a round early by informing the referee that they are finished for a round and they wish their robot to be retrieved. They do not need to spend a token to do this. If a team retrieves their robot in such a manner, they must place their robot in their starting area and may not restart the robot during that round.

b. **Exception:** The game rules may define some areas or conditions as “no rescue” zones. In those cases, teams cannot request to have their robot retrieved. These areas will be clearly defined; otherwise, all areas are considered open for rescue.

10. **Entanglement:** If two (or more) robots contact each other, each team may request that their robot be returned by raising their flag. Referees will retrieve their robots at no penalty. Any “free” piece is left on the field; any piece that is not “free” is returned to the team for their reuse. If a team chooses not to retrieve their robot after all the other entangled robots have been retrieved, that robot may only be retrieved after paying a token penalty.

a. **Exception:** The game rules may define some areas as “contact permitted” zones. In that case, teams that request to have their robots returned after contact will have to pay a rescue token.

11. Unless otherwise noted in game rules, scoring elements in the play area can be pushed, moved (by your or another team’s robot), and potentially de-scored. A scoring element that is pushed out of the play area can be immediately retrieved by the owner’s team. That scoring element is available for immediate reuse.

12. Any desired programming changes must be done only while the team is not currently competing.

13. Bluetooth communication to the robot is prohibited while the robot is competing.

14. If there is a tie in cumulative match points at the end of the seeding matches (between teams on the verge of moving into quarter finals), quarterfinals, or the final, the teams in question will compete head-to-head for a single round of the game. The winning team for that round will be considered the winner of the tiebreaker. If their point values are the same, a member of each team will compete in a game of rock, paper, scissors (best two out of three).

15. Each team will play in four seeding matches. After all seeding matches are completed, the top eight teams (determined by ranking points) will compete in a single elimination tournament (quarterfinals and finals). The top two and bottom two will play each other, and the middle four will play each other. The top four teams from the quarterfinals (regardless of which board they are playing on), will move to the finals. The top two teams from the finals match will be awarded the state trophy / runner-up trophy.

17. Each team is limited to 3 students at the field during a round. Teams are free to interchange students during rounds.

18. Robots which drive out of play are to be immediately retrieved. This does not include any detached robot parts, as they are no longer part of the robot. If they drive back into play before retrieval, anything the robot moves must be reset. The referee is responsible for catching this.

19. A robot that has driven into play and has completely exited the start gate may be retrieved if it drives back onto the Start Gate platform with at least one mobile component (e.g., wheel, caster).

20. False starts, e.g., leaving the Start Gate at the beginning of a round, incur a 10 second penalty. The team must immediately stop their robot, reset it in the Start Zone, and wait to start their program until the referee allows them.

21. Allowed lego pieces:

All Robot pieces must be official Lego parts, and have a valid part number. That can be checked on the official site, or [here](#) on brinklink.

Any modifications to lego components (cutting, drilling, sanding, gluing etc) is not allowed and if a modified piece is discovered on the robot during a match, that robot will forfeit the match and no points will be scored. The modified component must be removed before that team's next match. This includes broken lego pieces.

The lego hole punch will be allowed, but only for standard printer paper.

As long as the lego pieces are not modified as mentioned above in order to attach to the robot, they will be allowed. (i.e. Using regular lego along with technic, for example is fine)

Lego pieces can be used from home or wherever, as long as they do not break any other rules (legitimate, no modifications, etc).

Lego stickers will be allowed, only in a decorative way and must not serve any function.

Any gluing, taping, or modifying game pieces is not allowed, and the same punishment for modifications will be enforced.

Lego rubber bands are allowed, as like previous years.

Please check the GAPPS rules on the website for more details and rules.

Game Match Rules - “Robot Quest”

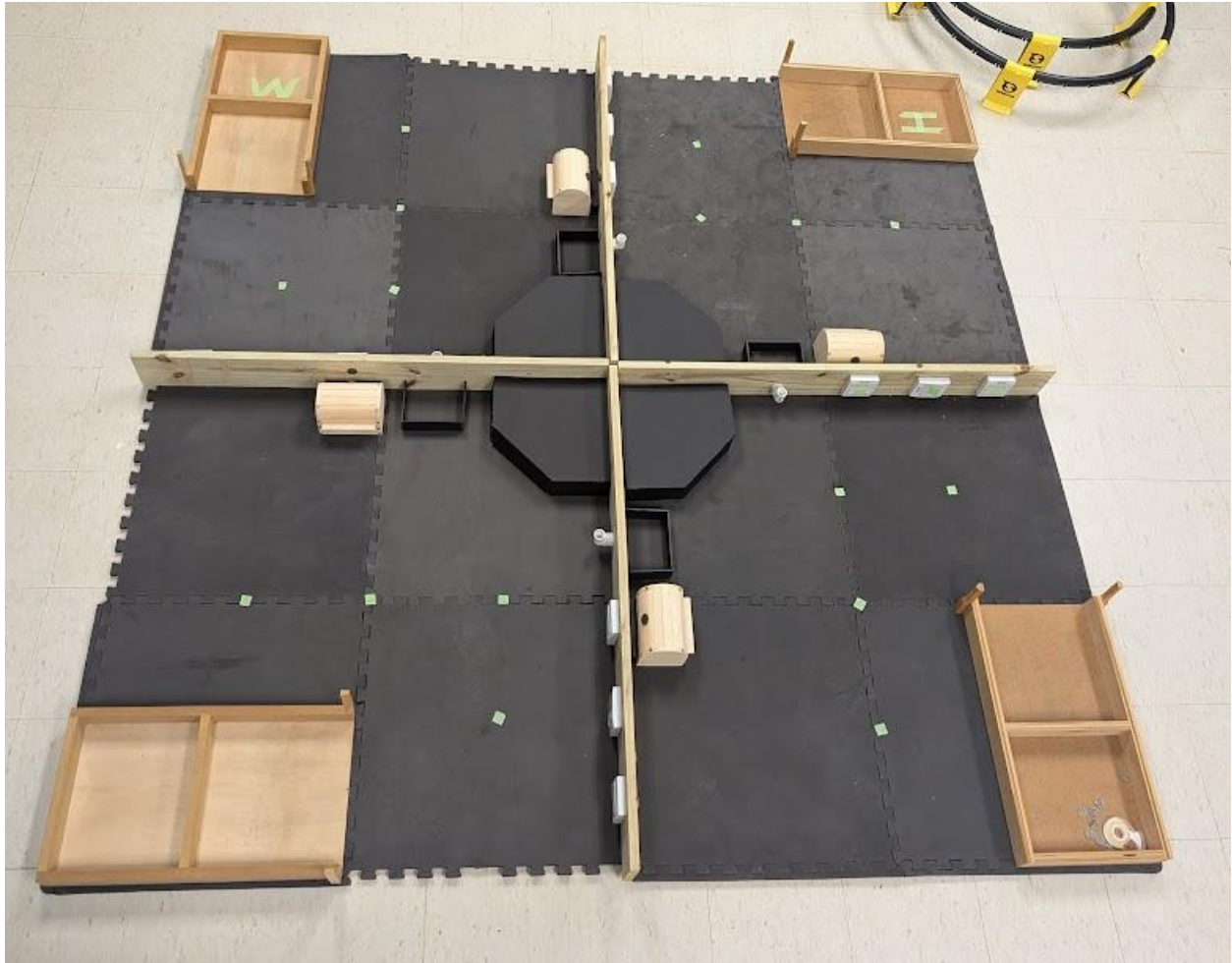


Figure 1: Full board.

This year's board will require a robot to fulfill a variety of tasks, building toward a main goal.

General Round Rules:

Each match will be made up of two, 90 second rounds. If a robot is still moving after the final timer, referees will award points based on where the robot is at the end of the buzzer. This includes scoring conditions. (i.e. scoring conditions made after the buzzer will not count, and the board reset to when the buzzer went off, to the best of the referees ability). Match points are scored after the second round.

Each team starts with 2 Rescue Tokens. Two more tokens will be earned at the end of the first round. Bonus points are earned based on the number of tokens remaining. These tokens will be used to “rescue” the robot whenever the students pay a token to the referee.

A robot “out of play” can be fitted with different attachments and scoring elements. Teams may also select programs already loaded to the robot when “out of play”, but no new programming may take place.

Robot attachments, whether they are designed to detach from the robot or not, are allowed to be used if they do not break the plane of the quadrant. Scoring Elements within a detached robot attachment are considered “Not In Control” and can, therefore, be scored as long as the Scoring Elements satisfy their scoring requirements.

Clarification: Detachable and non-detachable components can be added to the robot’s Start Zone and do not have to leave the zone with the robot. They must, however, be made of the same product as the robot (e.g. Lego robot must have Lego attachments).

Scoring Elements / Conditions:

Each quarter of the game board will be each team's playing field, with their own scoring elements. The scoring elements will be the same on all playing fields. Points are based on the condition of the field at the end of the match. If a scoring element from one team's quadrant goes into another team's zone, excluding the dice, the element will be left in the opponent's field. Dice, however, can be scored like normal by the opposing team.

See the scoring sheet at the end of this document for a scoring table.

There will be a separate document providing sample scoring conditions for potential corner referees to reference. And a scoring condition sheet (chest open/closed, pressed switches, grabbed sword etc) will be provided to each corner ref to help keep track of scored components during a match.

Shelf:



Shelf

The shelf and its pieces are the main goal of the game. Three shelf pieces are held by each corner referee. There are three scoring elements that provide these pieces: the chest, the switches, and the boss. These pieces will be given out as the tasks are completed and confirmed by the corner referee. Completion will vary based on the scoring element, which will be explained in each of their sections.

Once all three shelf pieces are acquired by the team. They can be attached to each other and placed on the shelf to score maximum points. To test if they are attached, the referee must carefully inspect and slowly lift the center of the blocks at least an inch above the shelf and if they all are together, full points will be awarded. If they break apart, then the points will be given based on pieces on the shelf, but not attached. All three pieces must be together to get maximum points. 2 connected pieces and 1 non connected piece on the shelf will count as 3 non-connected pieces.

If pieces are dropped on the mat or touching the mat, then they are considered “in play” and no longer in the team’s possession, or eligible for getting shelf points (they can be recollected). The blocks can hang off and score points, as long as they do not touch the mat.

Chest:



Closed Chest



Open Chest

The Chest is located on the left wall. The chest will normally be closed, with the team's task being to open the chest. To count as open, the chest must stick to the magnet and remain open until the robot leaves the field (using a token, driving off the field) or the round ends. Once the robot leaves the field or is retrieved via token, a shelf piece will be given by the referee to the team.

If the chest closes (for any reason) before the robot leaves the field, then no shelf piece will be given and the chest will not count as open. If it closes after the piece is given to the team, it will still be scored as open and points will still be awarded and the shelf piece will not be taken away.

Switches:



Switches in default position

Three switches are located on the right wall. These must be pressed to the marked side, with the goal to switch all three to receive a shelf piece from the referee. The piece will be awarded after the robot has left the field (using a token, driving off the field) or the round ends and all three switches are switched. Once a switch is pressed and once the robot leaves the field, that switch will stay “pressed”, in a scoring sense, the match.

Sword:



Sword in holder

The sword, represented by an uncapped sharpie (the cap will be located in the start zone holder), is located on the right wall, in the PVC holder. The goal is to use the sword to mark the boss notecard. The sword is to be removed from the holder and can be attached to the robot when it is out of play. If the sword is used and directly marks the boss without going out of play, points for sword possession will be awarded, as well as boss points and shelf piece.

If control of the sword is lost before leaving the field, it is considered “In Play” and is not considered part of the robot. It cannot be manually picked up by the team or the referee using tokens, the team will not get points related to sword possession. If the dropped sword is retrieved from the field, it can be used as normal, and points will be awarded.

Boss:



Boss notecard

The boss is on the left wall, represented by a notecard taped between two popsicle sticks. The boss's function is to be “attacked” by the sword. This is shown by making a mark on the notecard using the permanent marker. The mark can be any size, as long as it is visible on the card. Once the boss has been attacked the note card will be inspected for the mark. Once the mark has been confirmed by the corner ref, a shelf piece will be given to the team, once their robot has left the field (using a token, driving off the field), or if the round ends. The card will then remain until the end of the match.

If the boss is touched by the sharpie but no mark is shown, the sharpie will be tested by the corner ref to ensure it is not dried out. If the sharpie is not dried out, no points will be given and it will be given back to the team to try again. If the sharpie is determined to be dry, points will be given and the sharpie will be replaced next match.

The notecard will be replaced in between each match.

Dice/Pit:



Dice Pit

There are 4 dice located on the tape markers on the playing field. The colors do not matter, but they should be placed with numbers 1-4 pointing up, shown in the reset quarter board image. These are to be collected by the team and placed in the dice pit. They may be attached to the robot when out of play. Based on the number pointing up, points will be given. If a dice lands with multiple numbers pointing up (i.e. on a corner or leaning on a wall), the team will be awarded the higher point value. If the dice are partially out of the pit, they will still count, however if they are balanced on the pit walls, it will not count.

Dice will be scored individually, so if a 1, a 3, a 5, and a 6 are rolled, then the team would be awarded $20 + 20 + 20 + 15 = 75$ points.

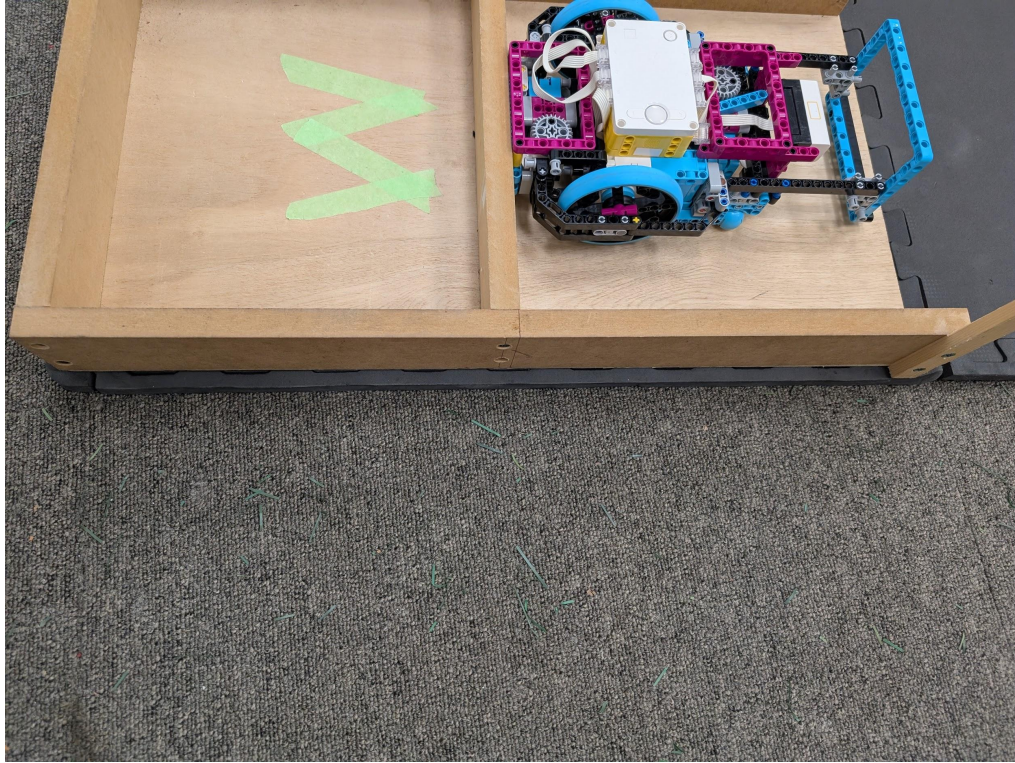
Dice will only be scored in the dice pit. No points for in team possession.

Field Scoring / Reset Order:



Fully reset quarter board, note the dice numbers and locations.

Throughout the game, the start gates may get shifted. If and when they do, they should be moved back as soon as moving them won't interfere with gameplay. They should be placed in line with the outer edge of the teeth, shown below, and quarters will be placed to align the start zone, similar with the walls.



Start gate orientation

Round 1:

- Robots will be returned to the start zone.

- Start zone will be realigned if necessary.

Round 2:

- Shelf pieces given to players based on objective completion.
- Robots are completely within the start gate.
- Start zone will be realigned if necessary.

End of Round 2:

- Robots are removed from play without disrupting scoring elements not in control.
- Shelf pieces are given based on objective completion and final scoring elements scored.
- Final scores are tallied.
- Scoring elements are reset/replaced:
 - Chest is closed
 - Switches are switched to the unmarked side
 - Shelf pieces are returned to corner ref
 - Sword is returned to holder
 - Boss notecard is replaced with unmarked one
 - Dice are placed back on markers

Penalties:

- De-scoring – Robots may not intentionally attempt to de-score an opponent's scoring elements in any way. The result of such a penalty will be removal of the offending team's robot from the field until the end of that round, and they must forfeit a token to the other team.
- Interference – Robots may not intentionally interfere with another robot trying to score in any way. The result of such a penalty will be removal of the offending team's robot from the field until the end of that round and they must forfeit a token to the other team.
- Penalty: Damage to the game field or Scoring Elements will be penalized by removal of the offending team from the current match. No points will be awarded including ranking points.
- Inadvertent team interference is a judgement call by the referee. In this case, no penalty will take place.

Special Notes / Conditions:

If a piece is in control of the robot when the round ends, it still counts as in their possession, and they can take it back with their robot to reset, as well as for scoring purposes.

The referee scoring sheet should be used to keep track of what pedestal pieces and elements have been collected by the team, in case board conditions change. That way, there will be less confusion. For example, if the chest was opened by the team, and the team left the field and scored the pedestal piece. But then later in the match knocked down the chest, the ref would've

marked on the scoring sheet that the team successfully opened the chest, greatly reducing errors in memory.

Any additional token earned from penalties will not exceed the 4 token point value (i.e. 5 tokens will be scored as 60).

“Robot Quest” Score Sheet

Scoring Element	Position	Point Value		Quantity	Points Earned
Blocks	On Shelf (Together, counts as 1)	200	x		
	On Shelf (Apart)	50	x		
	In start zone/team possession	25	x		
Chest	Open	50	x		
	Closed	0	x		
Switches	On	30	x		
	Off	0	x		
Sword	Drawn/In team possession	60	x		
Boss	Marked with sword	60	x		
Dice	Rolled Even in dice pit	15	x		
	Rolled Odd in dice pit	20	x		
Tokens	In team possession	All 4 = 60 3 = 40 2 = 20 1 = 10 0 = 0			
Total Points:					
Maximum Possible Points:					600