

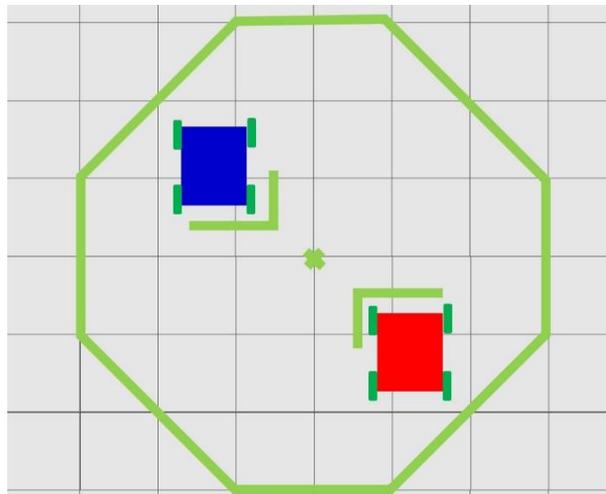
SUMO ROBOT COMPETITION

Event Summary: Two robots compete in a head-to-head match following the basic system of traditional human sumo matches. Robots are allowed no weapons. The sole purpose is a pushing match between the two robots to force the other from the arena.

Robot Control: Remote-control
Engineering Principles: Torque, mechanical engineering, electrical engineering

Section 1: Requirements & Specifications for the Sumo Ring

1. The sumo ring interior is defined as the playing surface surrounded by and including the border line. Anywhere outside this area is called exterior.
2. The ring shall be circular/octagonal in shape and of the appropriate dimensions for the given size class. It will be played on the floor tile of the classroom or on foam floor tiles.
3. Lines (starting lines) consist of two parallel lines centered in the ring with appropriate width and spacing for the given class. The separation distance between the lines is measured to their outside edges.
4. The border line is marked with tape. The ring area extends to the outside edge of this line.
5. There should be a space appropriate for the given robot size outside the outer edge of the ring. This space can be of any color, and can be of any material or shape as long as the basic concepts of these rules are not violated. This area, with the ring in the middle, is to be called the "ring area". Any markings or parts of the ring platform outside the minimum dimensions will also be considered in the ring area.



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Section 2: Sumo Robot Design Specifications & Requirements

1. A robot must fit within an 18" x 18" x 18" square box. A robot may expand in size after a match begins, but must not physically separate into pieces, and must remain a single centralized robot. Robots violating these restrictions shall lose the match. Screws, nuts, and other robot parts falling off from a robot's body shall not cause the loss of match, but can cause loss of points.
2. Parts that could break or damage the ring or floor are not allowed. Do not use parts that are intended to damage the opponent's robot or its operator. Normal pushes and bangs are not considered intent to damage.
3. Devices that can store liquid, powder, gas or other substances for throwing at the opponent are not allowed. Any flaming devices are not allowed.
4. Devices that throw things at your opponent's robot or your opponent are not allowed.
5. Sticky substances to improve traction are not allowed. Tires and other components of the robot in contact with the ring must not be able to pick up and hold a standard 3"x5" index card for more than two seconds.
6. All edges, including but not limited to the front scoop, must not be sharp enough to scratch or damage the ring floor, other robots, or players. In general, edges with a radius of greater than .005", as would be obtained with an unsharpened .010" thick metal strip, should be ok. The teacher may require edges that they deem too sharp to be covered with a piece of tape.
7. Robots will line up on their designated lines. When the signal is given, they will engage each other.
8. If a point is scored, each robot must reset to its original starting position and wait for the signal to resume. Time will continue to run during the reset time.
9. Robots are not allowed to 'grab' onto each other in a pinching way. All motions should be some sort of pushing / leverage.
10. No movement by the robots (even accidental) is allowed prior to the start of the match. Once on the field, any movement other than the "startup twitch" will result in the offending robot being disqualified for the round.
11. Any physical contact between a human and the robot once the round has started will result in a 10 point "touching penalty" being assessed against the human's team. This includes touching the robot to turn it on after the starting signal.

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12. When a measurement dispute occurs, "on top of the line" will count as in the ring.
13. Flipping a robot out of the ring will count as a scoring combo worth +15 points.
14. Be respectful of your opponent. Robot bullying and unfair play (as determined by the teacher) can result in disqualification.

Section 3: Sumo Scoring

To score, teams must either flip over or in some other way, incapacitate the opposing robot or push it out of the designated ring so that a portion of the opposing robot touches the floor outside of the ring line. Additionally, the robot closest to the center mark will receive points.

Remote Control Period

A signal will be given to begin the Remote Control Period. Full use of the Remote Control will be allowed during this time.

After 4 minutes of Remote Control function, a signal will be given to mark the end of the round. All robots must come to a complete halt and accept no commands from the Remote Control. *Any robot moving or responding to commands during this break will be disqualified from the round.* Once the robot stops, scoring will be calculated by the teacher to determine the number of points earned during the Remote Control Period.

Remote Control Period Scoring

The following point values will apply to any actions completed during the Remote Control Period:

- Flipping/ incapacitating an opponent	+ 5 points each time
- Pushing an opponent out of the ring	+10 points each time
- Robot closest to the center mark	+20 points (one time)
- 'Lost the Will to Fight' penalty	-5 points each infraction
- Human Contact / Interference	-10 points each time
- Wireless Penalty	-10 points each match
- Deconstruction Penalty	-10 points each time

1. 10 points shall be given when:
 - A. A team legally forces the body of the opposing robot to touch the space outside the ring, which includes the side of the ring its self.
 - B. The opposing robot has touched the space outside the ring on its own.

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- C. Either of the above takes place at the same time that the end of the Match is announced.
2. 5 points shall be given when:
 - A. A team legally flips or incapacitates the opposing robot. The flipped robot will have a 5 count from the teacher to right itself into its match starting position.
3. 20 points will be awarded to the team that is closest to the center mark.
 - A. A team that is touching or straddling the mark is considered the closest.
 - B. The teacher makes the final determination.
 - C. If a determination cannot be made, teams will split the points.
4. The match will be stopped and a rematch started under the following conditions:
 - A. A. The robots are entangled or orbiting each other with no perceivable progress for 5 seconds. If it is unclear whether progress is being made or not, the judge can extend the time limit for observable progress for up to 30 seconds.
 - B. Both robots move, without making progress, or stop (at the exact same time) and stay stopped for 5 seconds without touching each other. However, if one robot stops its movement first, after 5 seconds it will be declared as not having the will to fight. In this case the opponent shall receive points, even if the opponent also stops. If both robots are moving and it is not clear if progress is being made or not, the judge can extend the time limit up to 30 seconds.
 - C. If both robots touch the outside of the ring at about the same time, and it cannot be determined which touched first, a rematch is called.
5. Determining the Winner
 - A. A. The robot with the most points will be determined the winner of the match.
 - B. In the event of a tie in the final score, an extended match may be fought, during which the team who receives 10 points first shall win.

Section 4: Time of Match

1. One Match will be fought for a total of 4 minutes, starting and ending upon the judge's command. The clock shall start on the teacher's command. The clock will continue to run on all resets that are called.

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2. An extended match, if called for by the judge, shall last for a maximum of 3 minutes.
3. When the match is not won by either team within the time limit, an extended match may be fought, during which the team who receives 10 points first shall win.

Section 5: Challenge General Game Rules

<G1> All teams must adhere to all basic and specific Robotics Competition Rules as they are written, and must abide by the stated intent of the rules. Every team has the opportunity to ask for official rules interpretations PRIOR TO THE START OF THE COMPETITION ROUNDS. There may also be periodic "Rule Updates" given to the class as rules are questioned and interpreted. These updates are also "official" parts of the rules.

<G2> All teams are expected to conduct themselves in a respectful and professional manner while competing in Robotics Competitions. If a team or any of its members are disrespectful or uncivil to the teacher, class visitors, or fellow competitors, they will be disqualified from a current or upcoming Match. It is important to remember that we are all judged based on how we deal with adversity. Every team will have its successes and failures. It is important that we all exhibit maturity and class when dealing with any difficult situations that may present themselves in both Robotics Competition and our lives in general.

<G3> Teams are responsible for the construction and stability of their robot, including the cortex, VEX keys, wires, joystick, and batteries. When a team places their robot into the starting point of a match, they are ensuring that all nuts and screws are tightened, and everything is secured.

<G4> Teams are also responsible for the communication of their keys and charge of all of their batteries. Teams are responsible to check the condition of all of these and make sure they are up to date/ charged prior to the start of a match. If a robot comes apart, VEX keys stop communicating, or the batteries in the joystick or on the battery die, the match will continue on.

<G5> When reading and applying the various rules in this document, please remember that *common sense always applies* in the robotics competition. The teacher has final discretion over all rule interpretations and enforcement.

<G6> At the beginning of a Match, each Robot must be smaller than a volume of **18 inches wide by 18 inches long by 18 inches tall** for all in class competitions, qualifiers, and activities. An offending Robot will be penalized or removed from the competition at the teacher's discretion.

<G7> Each team shall include a certain number of Drive Team Members. No Drive Team Member may fulfill this role for more than one team at any given event.

<G8> Only Student Drive Team Members may touch the team's controls at any time during a Match, and are the only Drive Team Members allowed to interact with the Robot. Minor violations of this rule that do not affect the match will result in a warning. Teams that

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receive multiple warnings may also receive a Disqualification at the teacher's discretion. Egregious (match affecting) offenses will result in a Disqualification.

<G9> During a Match, the Drive Team Members must remain in their designated Alliance Station.

<G10> Robots must be placed on the field promptly. The red alliance has the right to place its Robots on the field last. During the elimination rounds, the higher seeded Alliance has the right to place its Robots on the field last. Once a team has placed its Robot on the field, its position cannot be re-adjusted prior to the match. A Team that violates this rule will have its robots randomly repositioned by the teacher.

~~<G11> Drive Team Members are prohibited from making *intentional contact* with any Scoring Object, Field Element or Robot during a Match, with the exception of the contact specified in game play and when protecting themselves. Disqualification at the teacher's discretion. Drive Team Members are not permitted to break the plane of field perimeter at any time during the match.~~

<G12> During a Match, Robots may be operated by all the Student Drive Team Members. The controller should be handed off each minute to another controller. In the event that a team does not have enough members to switch each minute for the entire duration, certain members may go more than once. However, members CANNOT take consecutive turns.

~~<G13> It is understood that Scoring Objects may unintentionally leave the field during match play. Objects that leave the playing field will be promptly returned to the playing field in approximately the same location from which they exited the field. Teams may not intentionally remove Scoring Objects from the field, while not in the process of Scoring/Building or removing Scored/Built Objects. Scoring Objects are expected to leave the field accidentally during Scoring/Building, however doing so intentionally or repeatedly would be a violation of this rule. Disqualification at the teacher's discretion. Note: Scoring Objects will never be returned to the playing field in a Scored/Built position.~~

~~<G14> Scores will be calculated for all Matches immediately after the Match after all objects on the field come to rest. No student may enter the field or touch any Scoring Objects until the teacher has indicated that it is alright to do so.~~

<G15> Robots may not intentionally detach parts during any Match, or leave mechanisms on the field. Disqualification at the teacher's discretion. Multiple intentional infractions may result in Disqualification for the entire competition.

<G16> Strategies aimed solely at the destruction, damage, ~~tipping over~~ or entanglement of robots are not part of the spirit of Robotics Class or Competitions and are not allowed. However, some incidental ~~tipping~~, entanglement, and damage may occur as a part of normal game play. If the tipping, entanglement, or damage is ruled to be intentional or egregious, the offending team may be disqualified from that Match. Repeated offenses could result in a team being disqualified from the remainder of the competition.

~~<G17> Robots must be designed to permit easy removal of Scoring Objects from any grasping mechanism without requiring the Robot to have power after a Match.~~

<G18> Field tolerances may vary by as much as ± 1 " , except where otherwise noted, so teams must design Robots accordingly. Please make sure to check the assembled field during Practice Time for exact layout and measurements.

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<G19> No team members may enter the field at any time except when the player does so to take the robot out of the field upon the teacher's announcement of a reset or stopping the match. To enter into the ring means:

- a. A part of the player's body is in the ring, or
- b. A player puts any mechanical kits into the ring to support his/her body.

<G20> A robot/ team is considered Unable to Continue the Match when the game cannot continue due to player's injury or robot's accident, the player who is the cause of such injury or accident loses the match. When it is not clear which team is such a cause, the player who cannot continue the game shall be declared as the loser.

<G21> The time required to handle injury/accident and whether the game should continue in case of injury or accident shall be decided by the teacher. The decision process shall take no longer than five minutes.

<G21> Participating teams are always responsible for the safety of their robots and are liable for any accidents caused by their team members or their robots.

<G22> Replays are at the discretion of the teacher, and will *only* be issued in the most extreme circumstances.

<G23> As long as the concept and fundamentals of the rules are observed, these rules shall be flexible enough to encompass the changes in the number of players and of the contents of matches.