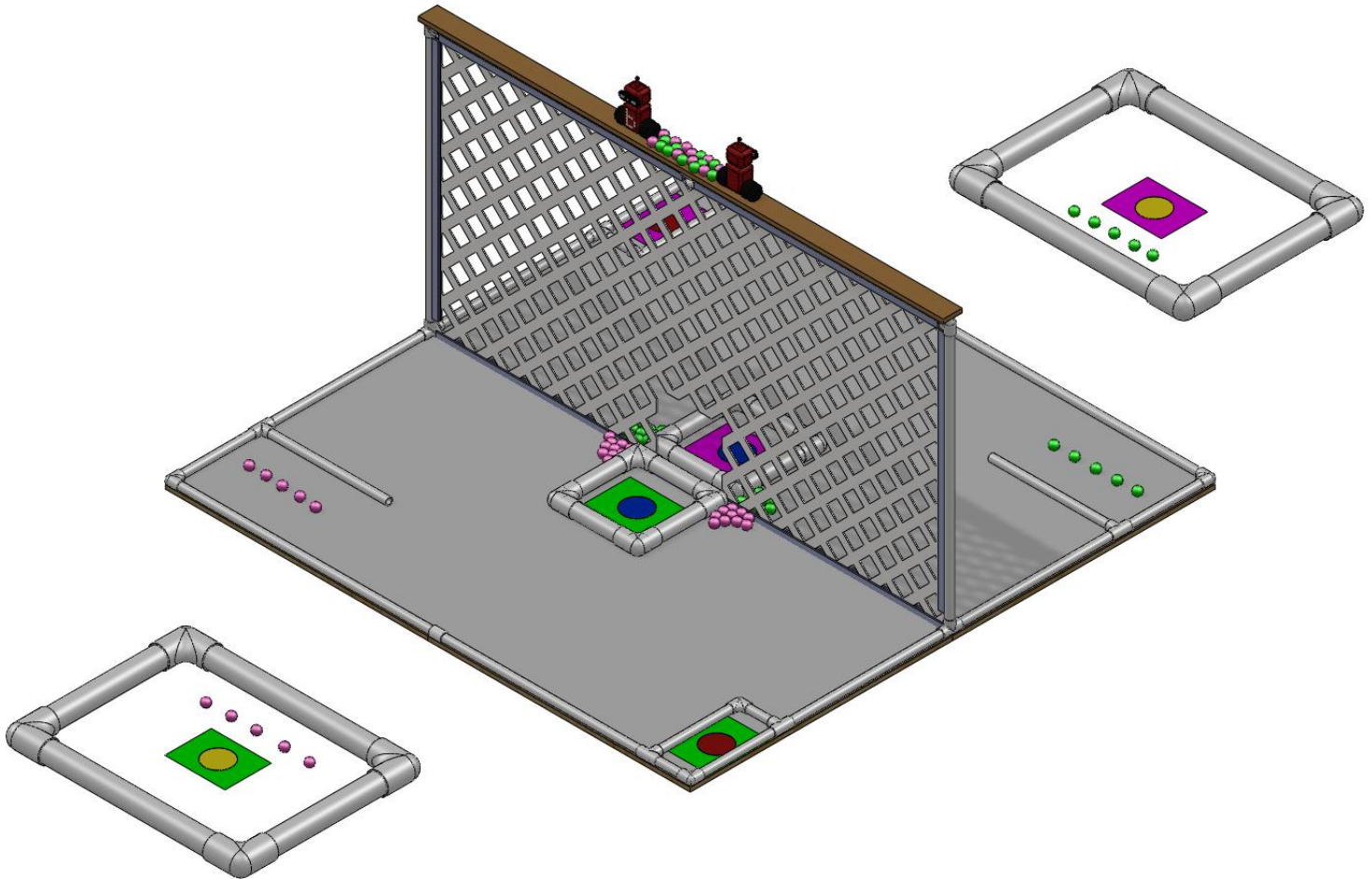


# 2012 KIPR Open Autonomous Robot Tournament Game Specification Version 1.6



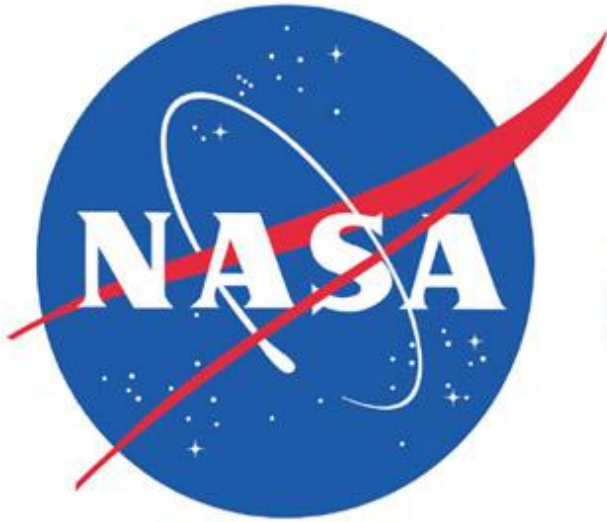
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# Update History

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v1.5: March 7, 2012 - Game Rules Released

v1.6: March 13, 2012 - Construction and rules clarifications

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# **International KIPR Open Tournament**

KIPR produces the International KIPR Open Autonomous Robot Tournament each year at the Global Conference on Educational Robotics. The 2012 Global Conference on Educational Robotics will be held at the Hawaii Convention Center in Honolulu, HI July 18-22, 2012. For more information on GCER, please see <http://www.kipr.org/GCER>

## **KIPR Open Game**

The KIPR Open Game is an autonomous robotics challenge designed and distributed each year by the KISS Institute for Practical Robotics (KIPR) to encourage ongoing robotics education beyond the high school level. This document presents the official game rules for the KIPR Open Game. These game rules are free for educational use and are used in college courses and robotics events throughout the world. For the latest information on the KIPR Open Game and the International KIPR Open Tournament, including updates to this rules document, go to [http://www.kipr.org/kipr\\_open](http://www.kipr.org/kipr_open).

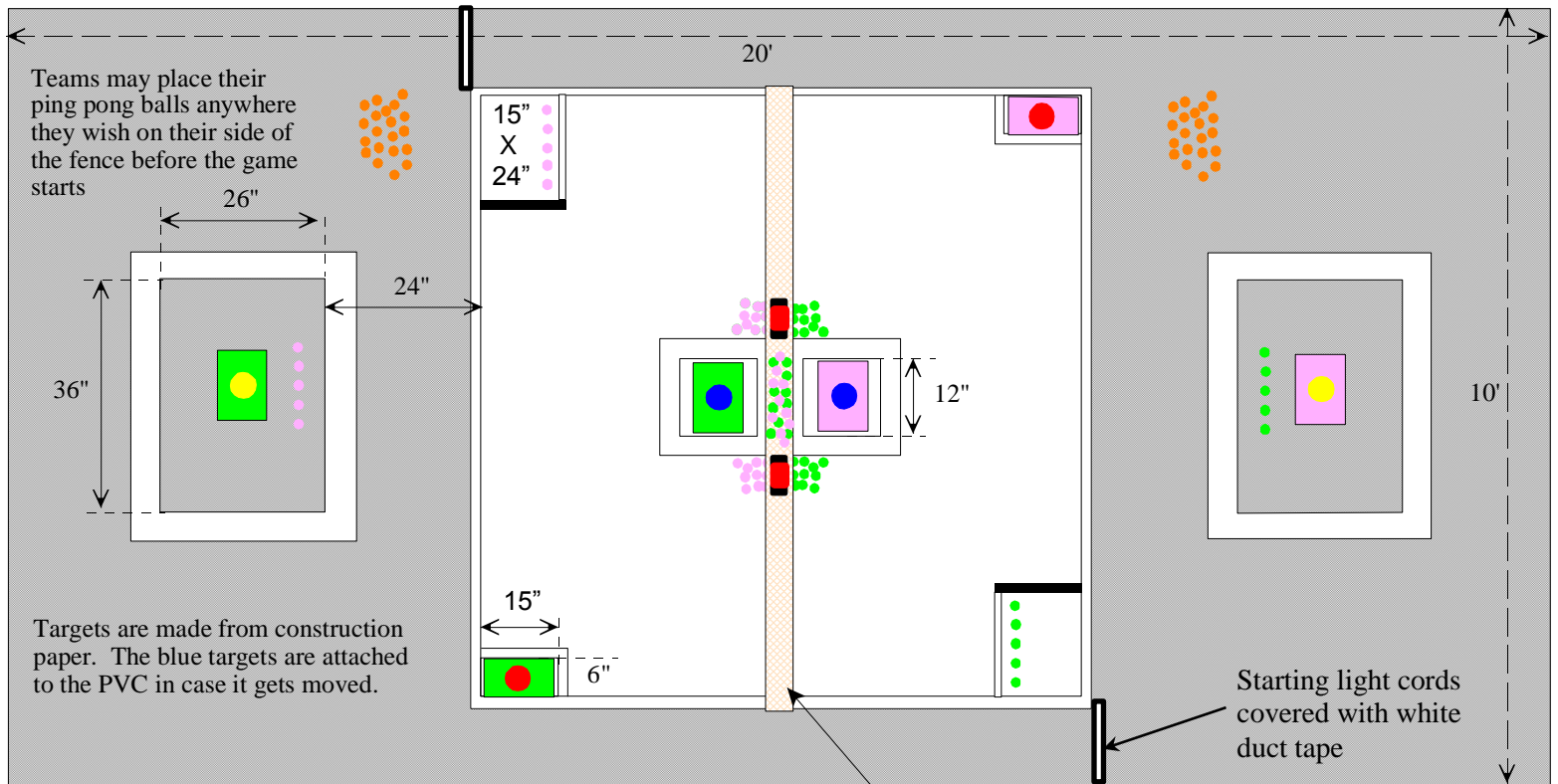
For information on KIPR's Botball Educational Robotics Program for students in middle school and high school visit <http://www.botball.org>.

## **This Year's Game: Go High or Go Low**

The challenge: locate target areas by flying over, scaling, or tunneling under a high obstacle, then prove you got there by depositing poms and ping pong balls.

# The Game Board

## 2012 KIPR Open Arena Layout



The fence is a sheet of 4' x 8' vinyl lattice held top and bottom by vinyl lattice cap molding. A 12" x 12" passage is cut out of the center bottom of the lattice & cap molding. A 1x4 wooden shelf (approx 0.75" x 3.5") is attached across the top of the fence.

The main board for the arena uses the same PVC as Botball 2012 with the exception of the injection chutes and the center divider is different. Dots are 5" diameter circles glued on 8.5" x 11" paper.

## Team Identification

A team is assigned either the pink or green side of the board. The green side has three green targets (large green paper with red, yellow or blue dot) and starts with the pink poms on its side. The pink side contains three pink targets and the green poms.

# Scoring

## Scoring Areas

- Your side: the 4 x 8 foot area on your side of the fence that is bounded by 1 inch PVC. Your side does not include any of the three target areas.
- Your red dot target: a fixed 6x12 area bordered by 1 inch PVC area located along the far edge from the fence
- Your yellow dot target: a fixed 36x26 inch area bordered by 3 inch PVC and located so that there is a 2 foot stretch of wild zone from the end of your side and the start of the yellow dot target
- Your blue dot target: a moveable 12x12 inch area bordered by 2 inch PVC that starts the game on your side adjacent to the fence and centered along the length of the fence
- Wild zone: a 20x10 foot zone in which the main board and the two yellow dot targets are centered (there is at least 1 foot of wild zone around all other parts of the game area. The wild zone is at least 10 feet high and is bordered by black duct tape.

## Scoring Items

40 – green poms

40 – pink poms

40 – orange ping pong balls, international standard size (40mm)

2 – Botguys

## Scoring Summary

	Their side	Their red dot target	Their yellow dot target	Their blue dot target	Wild zone
Your pom	1	5	15	10	0
Their pom					
Ping pong ball	1	2	5	2	0
Botguy	5	50	50	50	0

## Scoring: General

1. Teams score points by putting objects into targets on their opponent's side.
2. Judges score the game after the end of the match.
3. Each game piece that scores will only be scored for its highest scoring position, no matter how many areas it might otherwise score in.
4. Scoring areas are marked by the inside edge of the PVC surrounding them.
5. Except for the yellow dot target area, to score an object must either touch the surface of the scoring area, or rest on another piece that scores in the area while also in the vertical projection of the scoring area.
6. For the yellow dot target area, it is sufficient for an object to be in the (positive) vertical projection of the area for it to score.
7. At the start, a team's robots must be fully within the 24 x15 inch starting box on their side and/or the yellow dot target area – the virtual height of the starting areas is 15 inches.
8. If a team has a robot that starts from the starting box and touches the surface of the Wild Zone during game play, the result will be a DQ for the team.
9. Robots that start in the yellow dot target area are allowed to travel anywhere except for the restrictions on red and blue dot target areas on their side of the fence.
10. The vertical projection of the red and blue target areas extends 36" above the surface. A team's robot(s) can access the vertical projection of the red and blue target areas on their opponent's side of the fence with no restriction. On their own side any violation of the vertical projection must be for less than 2 seconds and there cannot be more than two such violations.
11. The blue dot scoring areas may be moved, but no edge may be lifted by more than 0.5 inch from the game table surface.
12. Teams may place their ping pong balls anywhere they wish on their side of the fence before the game starts (including on their robot(s)). The location is decided by the team.
13. The Botguys start the game on the shelf above the fence and to the right and left of the blue dot target areas.
14. Poms start the game:
  - a. 5 in your side's starting box (anywhere you want, including on your robot(s))
  - b. 5 in your yellow target zone (anywhere you want, including on your robot(s))
  - c. 10 in each of the two corners formed by your blue dot target and the fence – random arrangement by judges, but all touching the surface
  - d. 10 on the shelf mixed with the poms from the other side and placed between the two Botguy – random arrangement by judges, but all touching the surface of the shelf.



## **Tie Breaking**

In the event of a tie, the following tie breakers will be applied to determine the winning team (in order):

1. Team with the most points from the blue dot target
2. Team with the most points from the yellow dot target
3. Team with the most points from ping pong balls
4. Team with the most points from Botguys
5. Team with a robot power switch closest to their opponents side yellow dot target

# Game Board Construction

## Game Surface Materials

To build the Game Board surface, you will need:

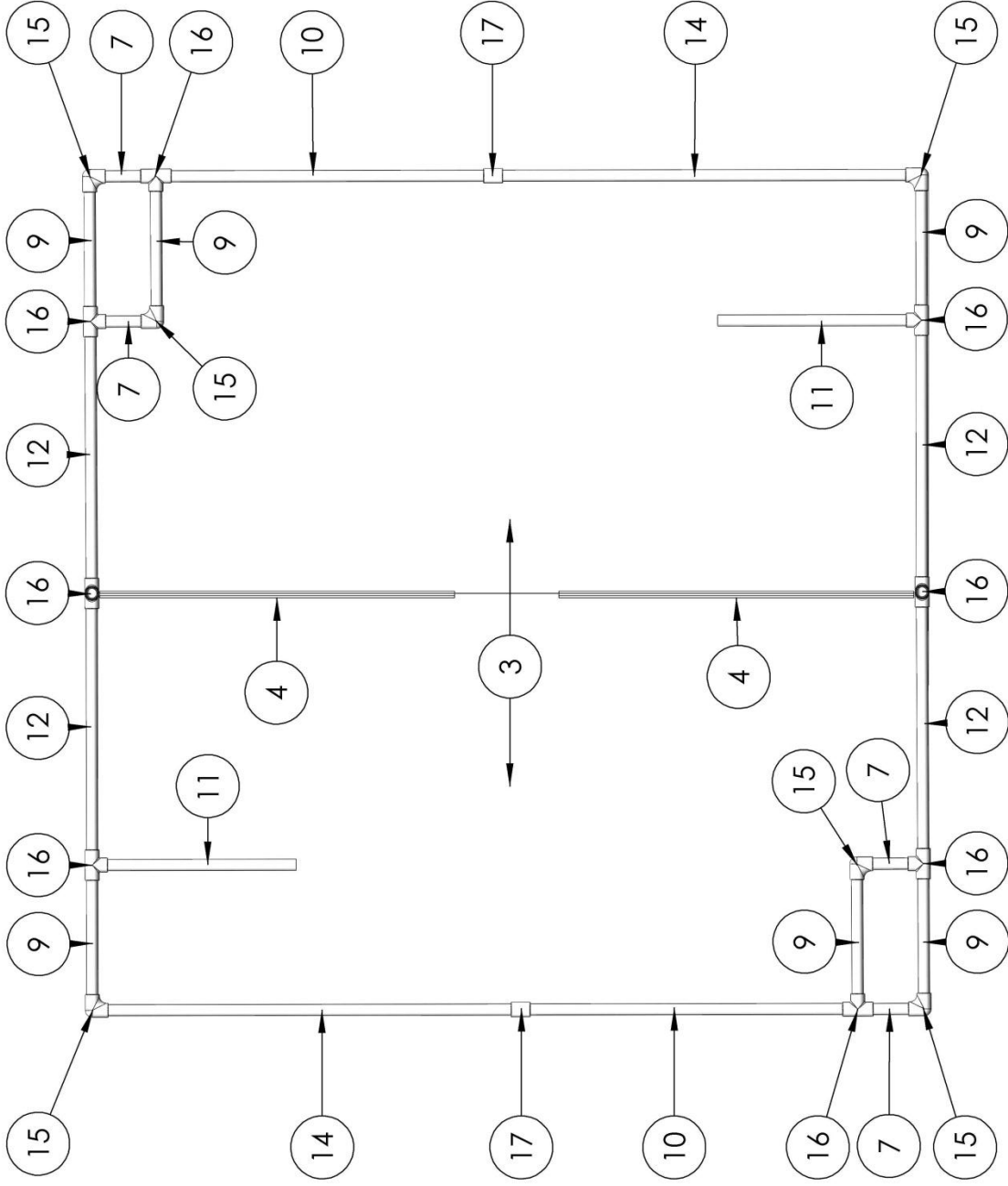
- 4 pieces of 4x4' MDF (122cm x 122cm)
- 2 pieces of 4x8' Fiberglass Reinforced Panels (FRP) (122cm x 122cm) [Home Depot Store SKU# 121586]
- 1 4x8" section of vinyl lattice [Home Depot Barcode #070673858864]

These are the same materials used for the surface in last year's game.

## Game Board Layout

- Designated areas (e.g., start box, scoring areas) are delimited by interior edges of their border material (PVC and/or tape)
- The height of the starting boxes is 38cm (15")
- Botguys sit upright on the center platform. They are centered lengthwise on the platform and 38cm (15") off of center to each side on the platform. The Botguy closest to your small starting box will face toward your side, and the other one opposite.
- Each team will start with 20 ping pong balls on their side of the fence
  - The team may place the balls anywhere in the netting, as long as it is on their side of the fence
  - Balls may not be damaged
  - Balls must start in the netting, even if not used
- Each team will start with 5 of their color poms in each of their starting boxes.
  - Poms may not be damaged
  - Poms must start in the starting boxes, even if not used
- After teams have set up and are ready to start, the judges will randomly place the remaining poms in the following fashion:
  - 10 of your color poms will be on the left side of your blue dot box by the fence
  - 10 of your color poms will be on the right side of your blue dot box by the fence
  - 10 of your poms will be mixed with 10 of the opposing poms and placed between the botguys on the platform above the fence



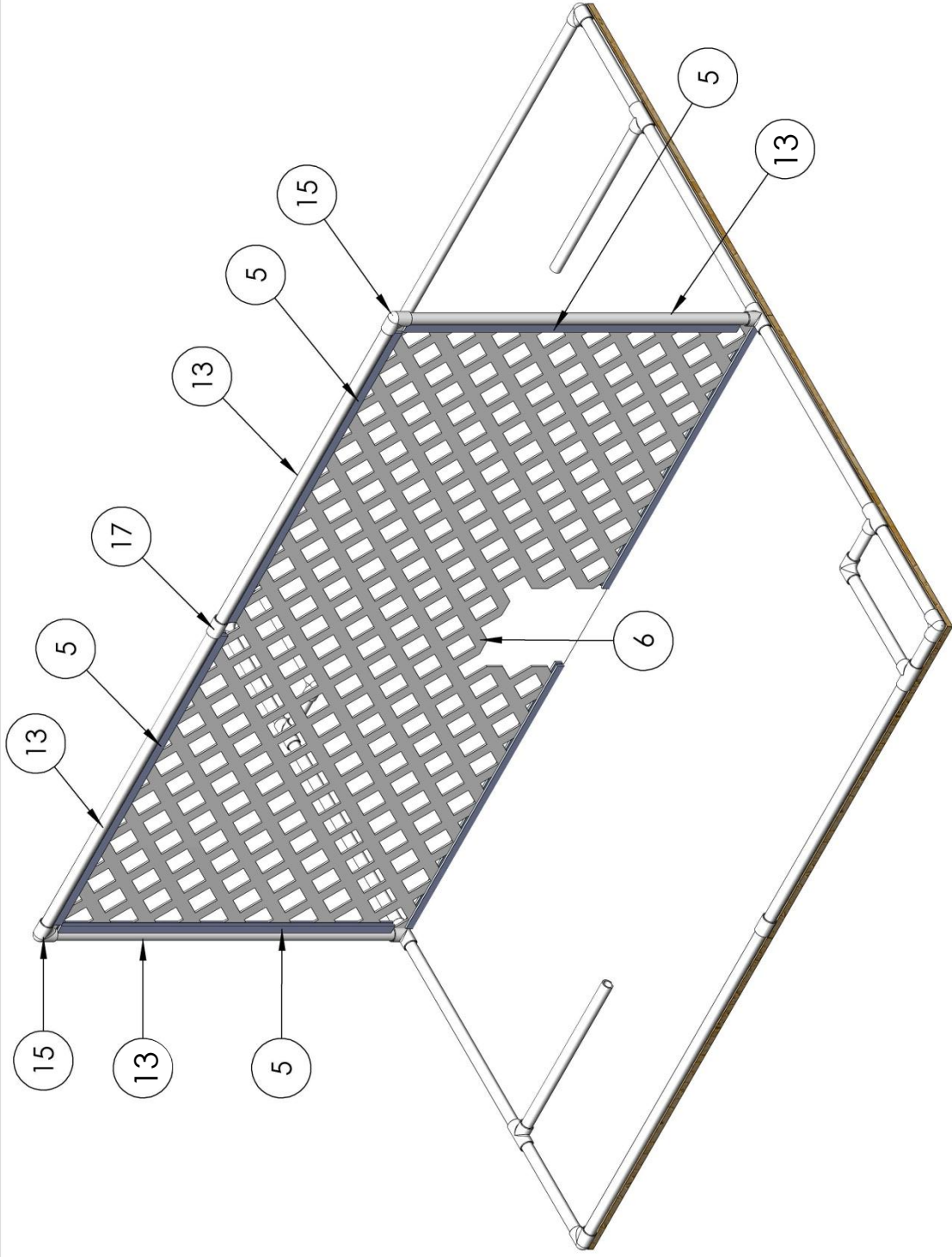


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SCALE: 1:64 WEIGHT: SHEET 2 OF 6

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1

TITLE:

Fence Assembly

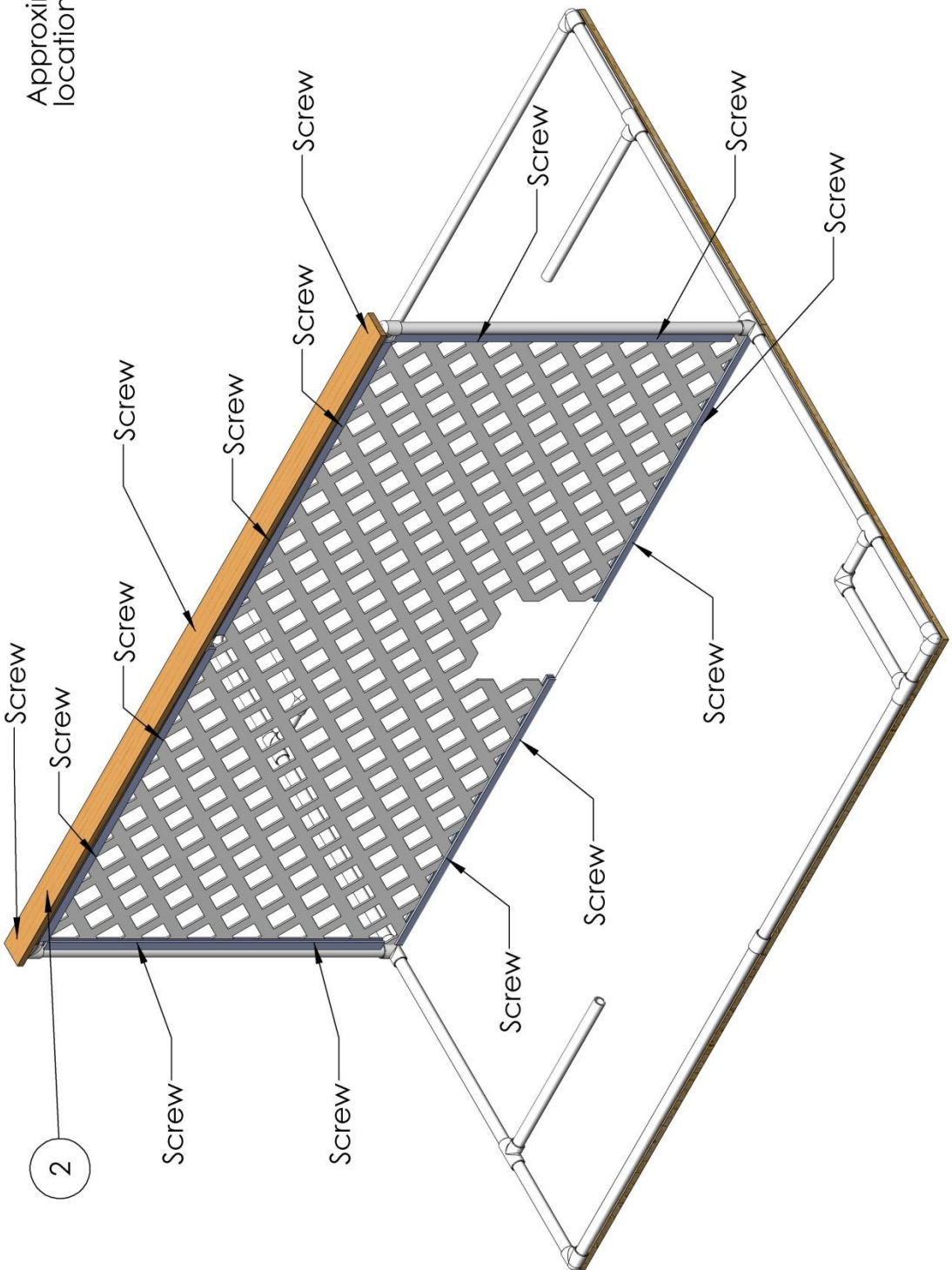
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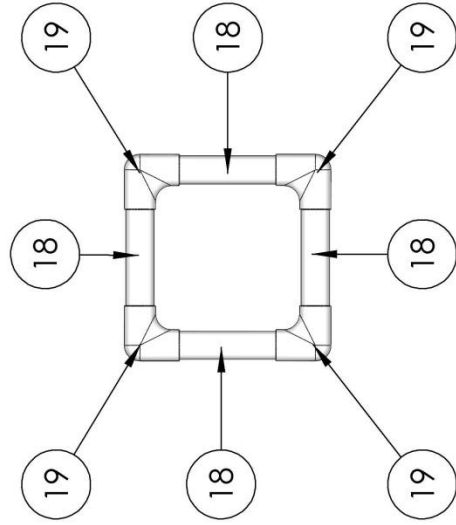
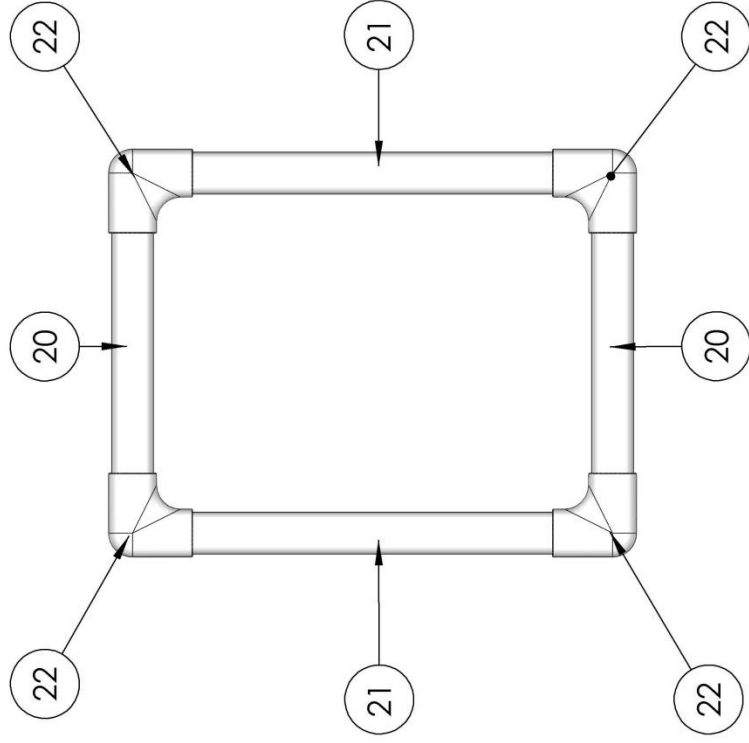


Approximate screw locations.

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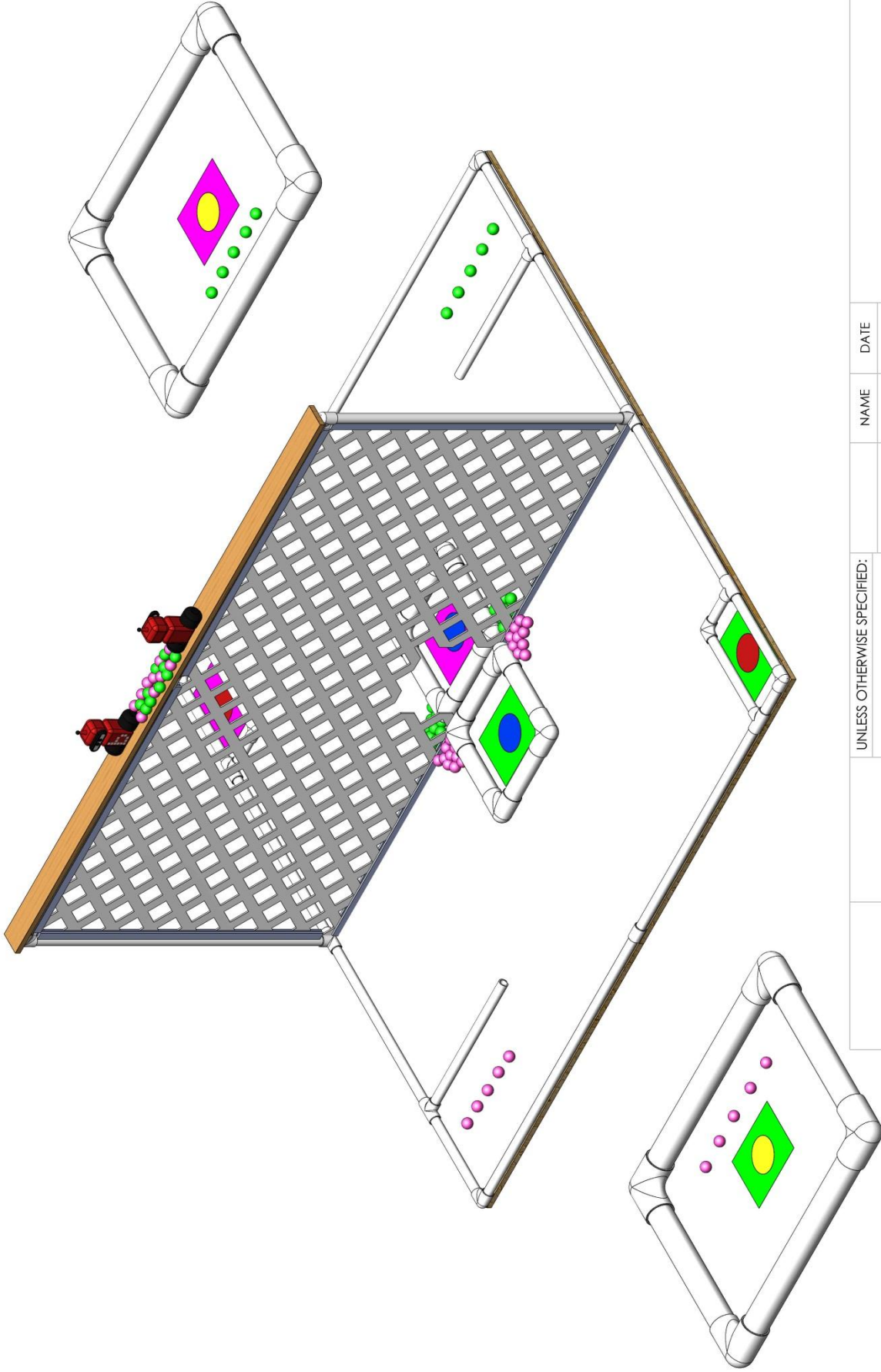
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PVC Boxes

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SCALE: 1:64 WEIGHT: SHEET 6 OF 6



The KIPR open board is modeled off of the 2012 Botball board with the following changes:

- Part 2 is removed (the U channel is screwed into the particle board underlayment)
- Parts number 15 and 8 are removed
- Part 10 increases in length from 20.5" to 36" and connects parts 17 and 15 (replacing the part 10 – 15 – 8 section)
- Part 6 increases in length from 11" to 47" for the taller fence
- Part 15 at the top corners of the fence are replaced with part 14
- The wood platform on top of the fence is screwed into PVC above the fence
- The platform may have additional pieces between the wood and the PVC, assume that there is no gap for grip or passage
- Parts 8, 22 and 23 are not used
- All measurements on official boards whose uncertainty is not otherwise specified will be as specified within +/- 1/2 inch (12mm) or 1%, whichever is greater. Deal with it.

# Robot Construction Rules

The following rules apply to all robots to be entered in the KIPR Open Robot Game:

1. A team's entry (all materials placed on the game-board) must mass less than 10kg (22 pounds).
2. A team's entry (all materials placed on the game-board) must fit within their (virtual) starting areas without restraint (other than pressing against interior edge of any game board PVC bordering the starting area).
3. The team's entry may not contain or release pressurized materials at greater than 7 bar (100 psi).
4. The team's entry may not release any liquids during the game, or before, during, or after the game while the team is at the game table.
5. The team's entry may not release any gasses while at the game table that are considered hazardous by the judges, or are at a temperature below 0°C (32°F) or above 50°C (122°F).
6. Robots may not contain features (manipulators, protrusions or materials) that are designed to, or are deemed by the judges likely to, cause damage or destruction to the game board, or to game pieces, or to a reasonably constructed opponent robot.
7. A team's entry may not contain features (manipulators, protrusions or materials) that are designed to, or are deemed by the judges likely to, cause jamming or entanglement of a reasonably constructed opponent robot. Blocking and containing of opponent robots is allowed; strategies likely to entangle or damage opponents or the board or game pieces are not allowed.
8. Robots must operate autonomously (no external power or control from outside of the game board area will be allowed).
9. Each team may only have a maximum of four independent structures on the game board at a time.
10. Each robot must have a name suitable for broadcast over a PA system.
11. Team entries may NOT contain parts that may reasonably be confused with game pieces (entries may not contain mirrors, lights, colored objects, or tape designed to confuse an opponent).
12. A team's entry may be made out of any materials or parts (including Botball and non-Botball kits) as long as the entry conforms to the construction rules above.
13. Robots designed to leave the surface must do so with the safety of spectators in mind. The wild zone is restrained by netting to contain its volume (10'x20' surface and at least 10' vertically). The netting cannot be used for any purpose other than preventing a robot from unintentionally leaving the wild zone, intention being a decision of the judges.
14. No projectiles can be used other than game pieces (poms, ping pong balls and Botguys) which may be launched by the team's robots with no restrictions.
15. For any robot whose safety is in question, judges will decide whether or not the robot is allowed to compete. All judging decisions are final.

# KIPR Open Tournament Rules

## Team Membership

- At least one team member must be beyond High School in their educational careers.
- College students, professional engineers, hobbyists, poets, and anyone else fulfilling the criteria above are all encouraged to participate.

## Seeding/Performance Rounds

1. S/P Rounds take place before the double elimination rounds
2. S/P rounds consist of best two out of three, unopposed rounds
3. Scoring = (your points) - (their points)
4. Scores of less than -1 will be counted as 0
5. Passing on a round gives a score of -1 for that round
6. Seed Score = average of best two rounds

## Double Elimination Tournament

1. A team is out of the tournament when it has lost two games
2. Initial matches are decided by seeding round
3. Matches are arranged using KIPR tournament software
4. Judges' decisions are final

## Double Elimination

1. A team's entry must have broken the border of a starting box sometime during the 180 seconds of game play or that round will be forfeit.
2. Robots must stop all motors and other actuators at the end of the round. Failure to do so will result in loss of round (unless the other team never broke out of the starting box).
3. If neither team's entry manages to break the border of a starting box during game play, the round will be replayed once. If it happens again during the replay, the round will be decided by coin toss.
4. At least one robot from a team must be outfitted and programmed to respond to the starting light. A robot team that operates exclusively on a timer triggered by a hand operated switch is not allowed and will automatically cause that team to forfeit that round.

## Tournament Logistics

1. Teams shake hands and visually inspect each other's robots before calibration.
  - a. If either team wants to challenge the validity of the robots they are facing, they have to do it then.
  - b. Inspection is limited to a max of 1 minute unless a specific challenge is made.
  - c. Challenges have to be of the form:
    - i. That robot contains high explosives
    - ii. That robot's hardened steel spike is designed to damage other robots.
  - d. Judges will be the final arbiter.
    - i. Judges can dismiss what they believe to be spurious challenges
  - e. Teams found in violation will (unless the judge decides there have been extenuating circumstances) forfeit that round or at the judge's discretion, be allowed to remove the offending pieces before the round begins.
  - f. In no case will a robot that is determined before the beginning of the round to be in violation of the construction rules be allowed to play while in that state.
2. If the judges determine that a robot violates the construction rules, whether or not a challenge has been made, that robot will not be allowed to run until it has been modified to meet the rules.
3. Construction rules apply only to what is brought to the game table
4. Teams cannot use infrared links to program their robots within 10 yards of the game board.
5. During setup teams may adjust starting lights:
  - a. Starting lights may not be in physical contact with any robot
  - b. Starting lights may not be aimed to disrupt an opponent or blind anyone (judge's decision)
  - c. Starting light cords will be taped down where indicated on the Layout, and will not be moved before or during gameplay
6. During setup teams perform any necessary calibrations needed by their robots.
  - a. Setup time should be two minutes or less.
  - b. For each minute or fraction thereof in excess of 2 minutes the team's score will be reduced by 20%.
7. When both teams are ready, or judges decide adequate time has been allowed for calibration, teams activate their robots and then -- Hands off!
  - a. After hands off, no part of a team's robot(s) may leave the starting box until the starting lights turn on.
    - i. If this happens, the judges will call a fault on the team.
    - ii. If a team receives a 2nd fault in a round, they forfeit the round.
  - b. After hands off, judges will finalize game board setup.
  - c. After hands off, judges will turn on the starting lights to signal game start.
  - d. After hands off, teams may not broadcast ANY physical or electromagnetic signals to their robots.
  - e. When the starting lights turn on the robots must autonomously start.
8. Game duration is 180 seconds.

9. Lights will remain on for 5 seconds, turn off for 170 seconds and flash the last 5 seconds.
10. Once the starting lights are turned on, the round counts unless a judge rules outside interference.
11. Robots must cut power to their motors and turn off or stop issuing motion commands to servos by the end of the round or risk forfeiting the round.
12. Scoring is based on the location of pieces at the end of the round, not how the pieces got there.
13. There are no instant replays, and attempts to use videos to question a decision will be ignored.
  - a. If a team is unhappy with a judge's decision, they should challenge it then and there.
  - b. Challenges to scoring after the teams have left the table, will not be considered.
14. Teams cannot touch, borrow equipment, modify robots or computers, or beam commands to another team's stuff (including their pit table) without the permission and presence of a member of that team.

## Advice for Tournament Participants

Test your robots from start to end:

- a. Go through the entire starting sequence
- b. Test your robot on both sides of the game table
- c. Make sure you can calibrate to the starting light
- d. Make sure the robots stop when they are supposed to: verify with a stop watch!
- e. Does the starting sequence work with very different lighting conditions? (tournament tables will not have lights above them, only the illumination in the room.)
- f. Test the shielding of your sensors!

Check [http://www.kipr.org/kipr\\_open](http://www.kipr.org/kipr_open) regularly for rules updates.

Check out the KIPR Open Robotics Game discussion board and FAQ at <http://community.botball.org>

Good Luck!