RECF LAUNCH
ROBOTICS COMPETITION
CROSSFIELD

2026-2027

Game Manual Version 1.2

The RECF Launch Robotics Competition is operated by the
Robotics Education & Competition Foundation (RECF), a 501(c)(3) nonprofit.

RECF ROBOTICS COMPETITIONS

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November 10, 2026

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1.0 Introducing the 2026-27 Launch Game: Crossfield

Format: 1 team vs 1 team
Drive Teams: 2 students (for Unified divisions of RECF robotics, this must be a Unified pair) per team
Field: 6'x8' or 12'x12'
Robots: Up to 16"x16"x16" at the start of the match; must be operated by remote control and/or pre-written code
Match Length: 90 seconds, with a controller hand-off between 50 & 40 seconds remaining on the timer

1.1 Program Objectives and Gameplay

Crossfield is an intuitive and accessible way for students to practice navigating a field, manipulating game objects, and working against an opponent. The simple game objects and protected space for gameplay allow students to focus on the mechanics and operation of their robot as they pick up and score game objects across a divided field to test their skills. It's a good way for students to learn and practice with robots before competing outside the classroom.

In Crossfield, each team operates on one half of the field and is not allowed to cross the divider. Robots pick up balls and move them into goals. Each match lasts 90 seconds, and teams earn points based on where balls are at the end of the match. For most goals, your robot has to score onto the 'other' side of the divided field—the farther away the goal, the more points it's worth.

1.2 Materials Needed

1. Field divider
    - 6x8 field: 72" tension-adjustable shower curtain rod with rubberized ends that divides the field into two 4x6 areas
    - 12x12 field: 3 segments of 2" PVC with two 2" PVC connectors (5', 5', and 6'1") that connect to divide the field diagonally when placed into the field
2. White electrical tape
3. 60 plastic practice baseballs, indoor pickleballs, or similar objects (~2.83", for example https://www.amazon.com/dp/B0G1349XJW)
4. 2 corner goals
    - Option A: Each goal is constructed from two 3'x4' trifold corrugated cardboard or foam core presentation boards connected with binder clips
    - Option B: Each goal is constructed from three 2'x3' coroplast or sturdy cardboard panels, connected with medium-length zip ties
5. Optional long zip ties to connect goals to perimeter
6. Optional grommets or tape used to reinforce throughholes

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1.3 Field & Scoring Locations

See sections 1.5 and 1.6 for field layout diagrams.

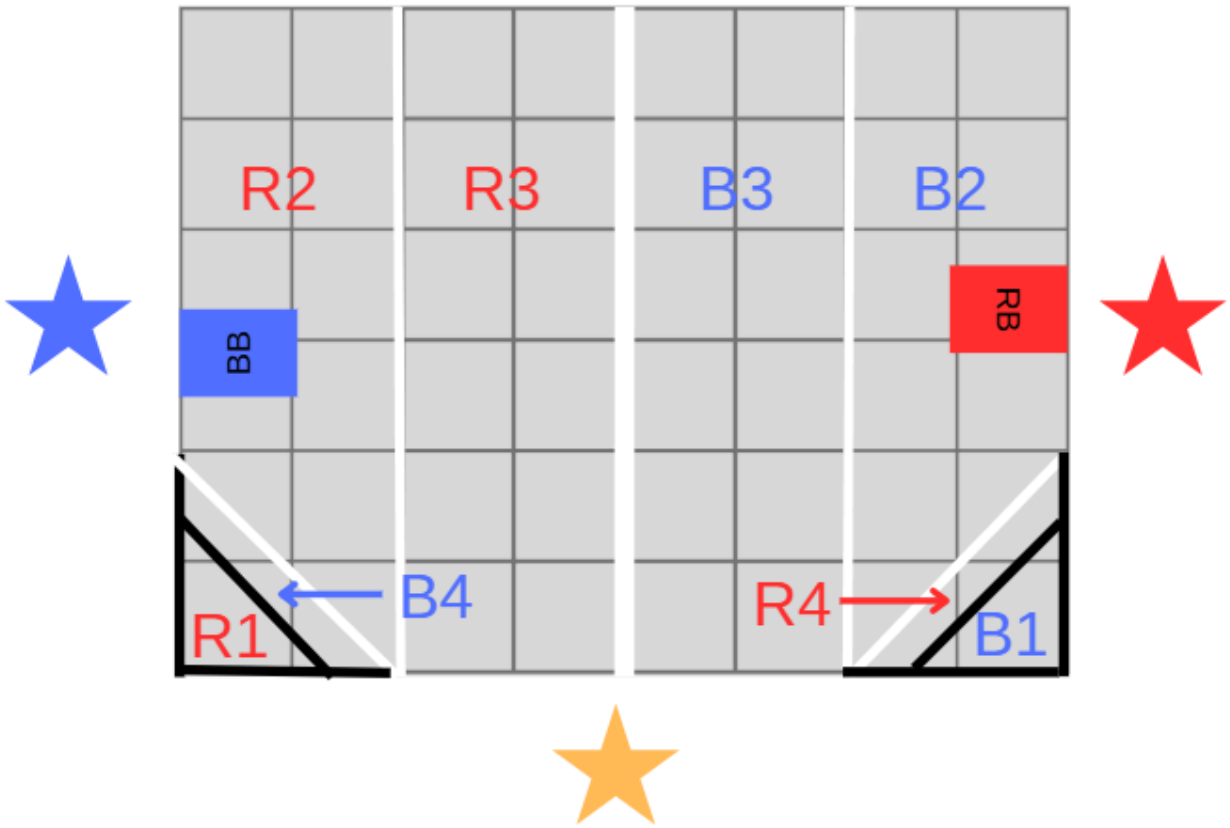
1. R1 & B1: Highest-value goals, which require the longest-distance scoring action; a ball counts as scored in one of these goals if it ends the match at least partly inside the volume of the goal (breaking the plane of the front panel).
2. R2 & B2: Medium-value goals that consist of a portion of the open field, between two tape lines. If any part of a ball is overhanging a level 2 goal it counts as scored in that goal.
3. R3 & B3: Medium-value goals that consist of a portion of the open field, between a tape line and the divider.
4. R4 & B4: Low-value goals that consist of a portion of the open field, between a corner goal structure and the tape line directly in front of it. A ball must be entirely behind the tape line to count as scored in this goal, which gives teams a low-value location to score pushed balls on their own side of the divider.
5. Red & blue stars: Indicate sides of the field where the teams' drivers can stand or move during the match
6. Red & blue rectangles (RB & BB): Indicate the red and blue robots, which can begin the match in any position that meets the following criteria:
    - In contact with the field wall
    - Inside their opponent's level 2 goal (6'x8' field) or level 3 goal (12'x12' field)
7. Yellow star: Referee(s) and/or scorekeeper(s) can be at either end of the divider, or both.
8. Wide white line: Field divider
9. Narrow white lines: Single lines of electrical tape
10. Black lines: Corner goal structures

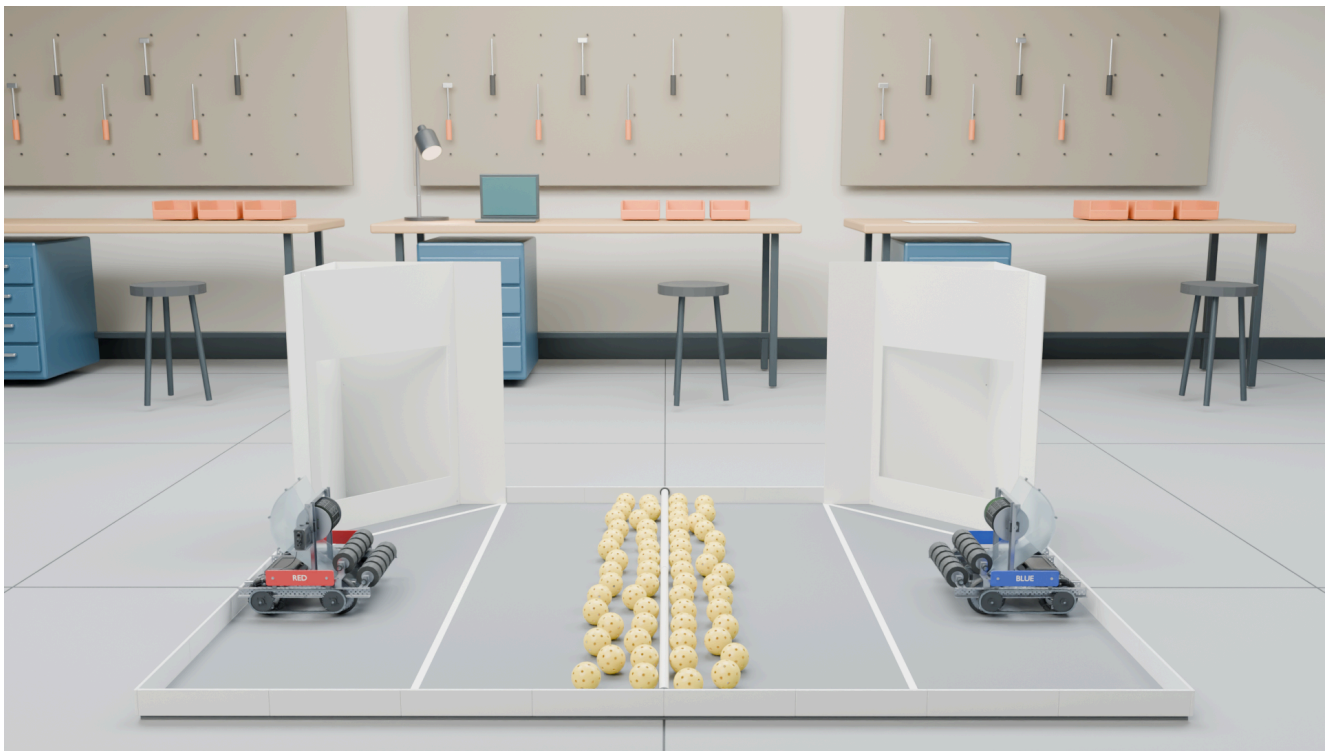
1.4 Scoring

1. R1 & B1: 10 points per ball
2. R2 & B2: 3 points per ball
3. R3 & B3: 1 point per ball
4. R4 & B4: 1 point per ball

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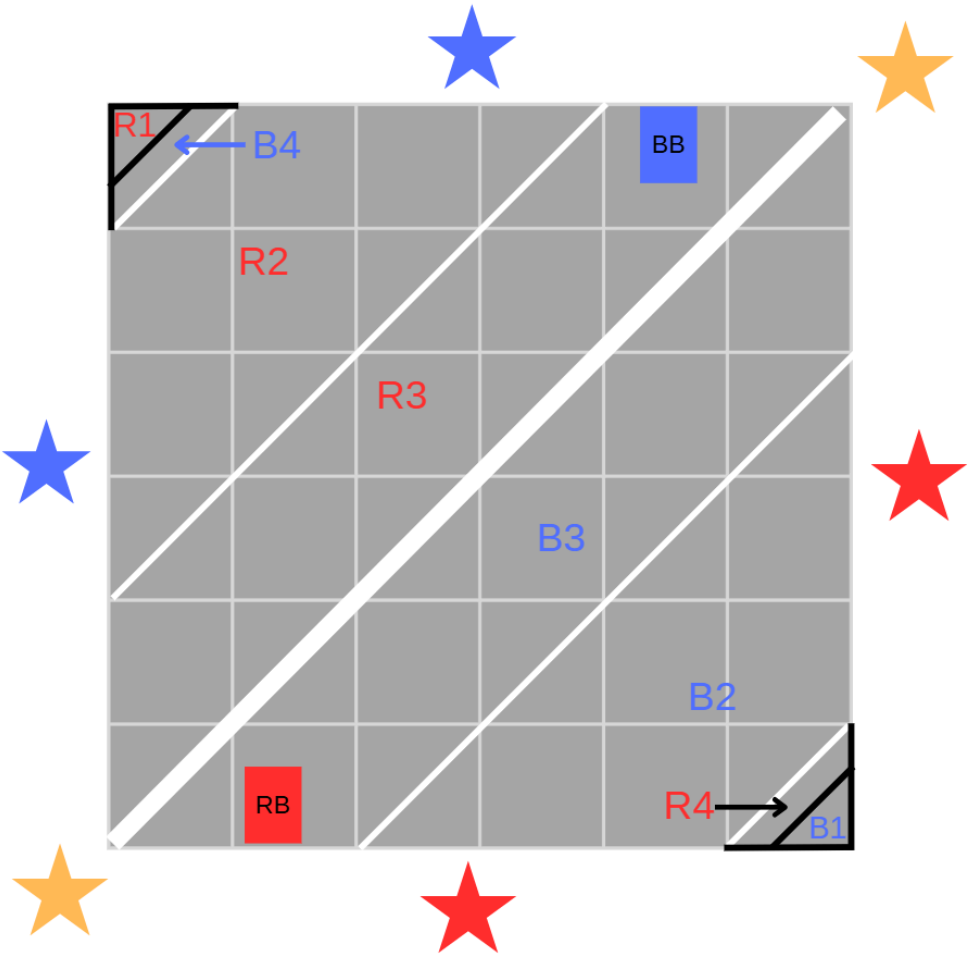
1.5 6’x8’ Field Layout

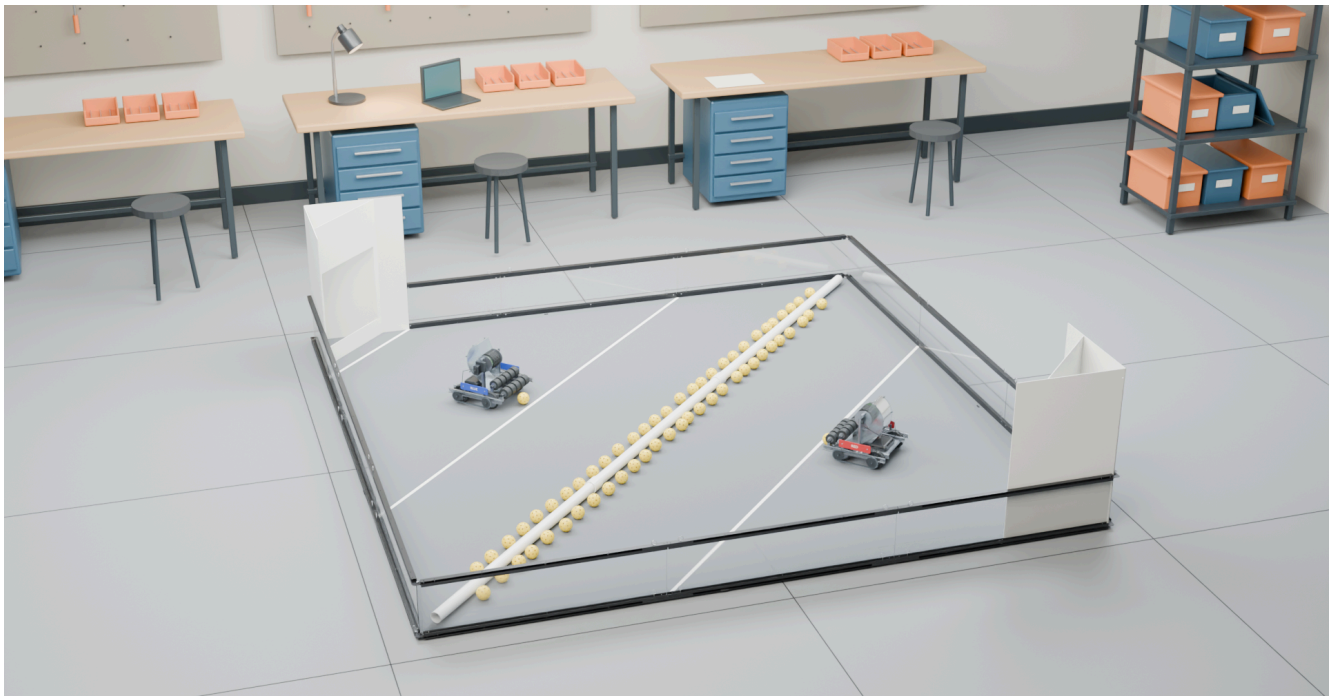




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1.6 12’x12’ Field Layout





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1.7 Gameplay Rules

1. Robots must begin the match no larger than 16”x16”x16”.
2. Robots can expand in any direction during a match.
3. Robots can’t go over, under, or through the divider, and can’t lift or remove the divider.
4. Robots can’t drive past the white tape lines in front of the corner goal structures.
5. If a ball leaves the field, a referee should return it by resting it on the divider and releasing it to fall randomly on either side.
6. Each team can only send two drivers to each match (the drive team), but they don't have to send the same students for each match.
7. Each drive team member can only operate the robot for half of the match. The first driver must hand off their team's controller to their partner within the 10-second period between 50 & 40 seconds on the 90-second match timer.

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2.0 Field Assembly & Setup

The instructions in this section describe how to create and place objects on the field. When multiple options are available (e.g., for different field sizes or materials), both are included.

2.1 Field Divider

- 6’x8’ field: 72” tension-expanding shower curtain rod set at the centers of the long sides of the field, with the rod approximately 2" above the field surface.
- 12’x12’ field: Cut three lengths of 2” PVC (5’, 5’, and 6’1”), and connect them into a single length using 2” PVC connectors. Lay the resulting assembly diagonally inside the field perimeter.

2.2 Tape Lines

- 6’x8’ field
  - Tape line dividing each 6’x4’ segment of the field into two 6’x2’ segments
  - Tape line in front of each corner goal structure, meeting the field walls at points 2’ from the corner
- 12’x12’ field
  - Tape line in parallel with the center divider, meeting the field walls at points 4’ from the corners
  - Tape line in front of each corner goal structure, meeting the field walls at points 2’ from the corner

2.3 Corner Goal

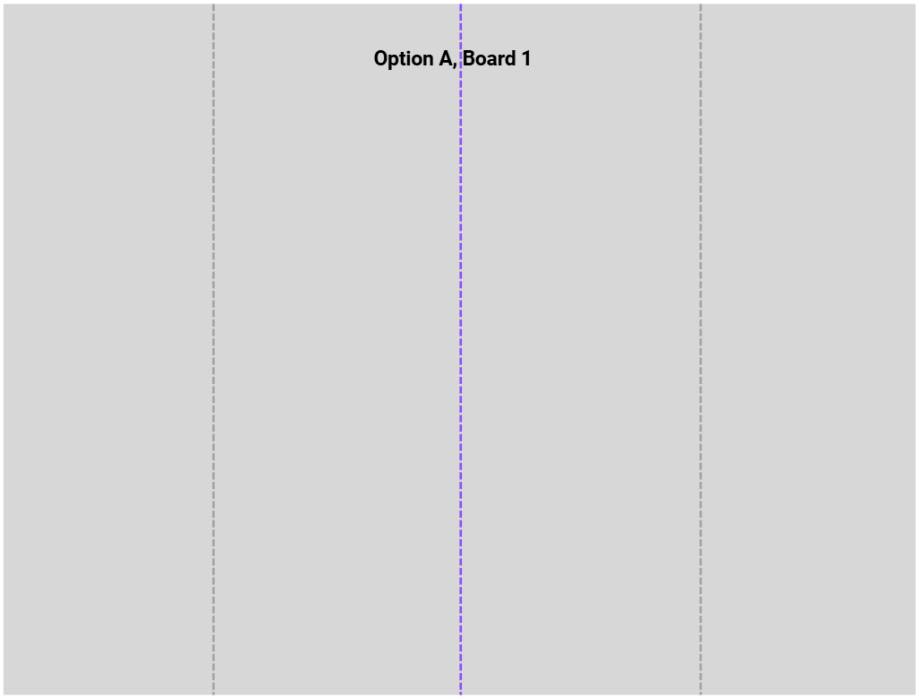
Build two corner goal structures, which can be assembled as either option A or B. Option A is easier to disassemble for storage, and option B is more durable.

Option A: Structure built from two 3’x4’ trifold presentation boards

Board 1

- Use a measuring tape/yardstick, straight edge, and pencil to measure and mark a line at the center of the back side of the board (shown as a purple dashed line in the image below)
- Lightly score the line with a utility knife, then fold the board along that line into a 90 degree angle

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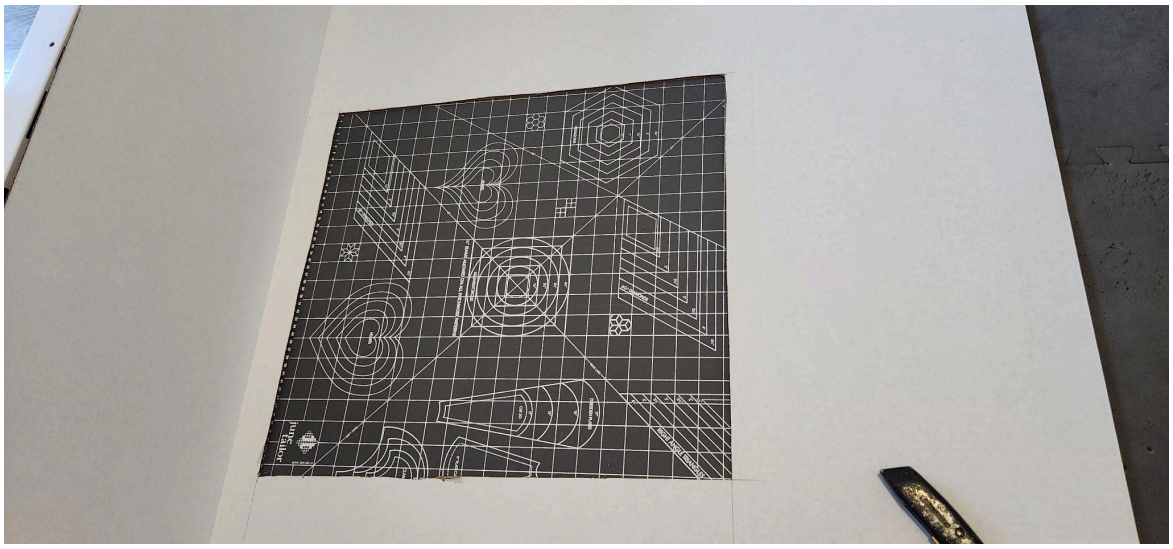
Board 2

- Use a measuring tape/yardstick, straight edge, and pencil to measure and mark the following lines in the center (2’ wide) portion of the board:
  - Horizontal line in parallel with the bottom of the board, 4.5” from the edge of the board
  - Vertical lines 1.5” inside of the folds of the board, beginning at the horizontal line and continuing to a point 24” from the bottom edge of the board
  - Horizontal line connecting the vertical lines at a height of 24” from the bottom of the board



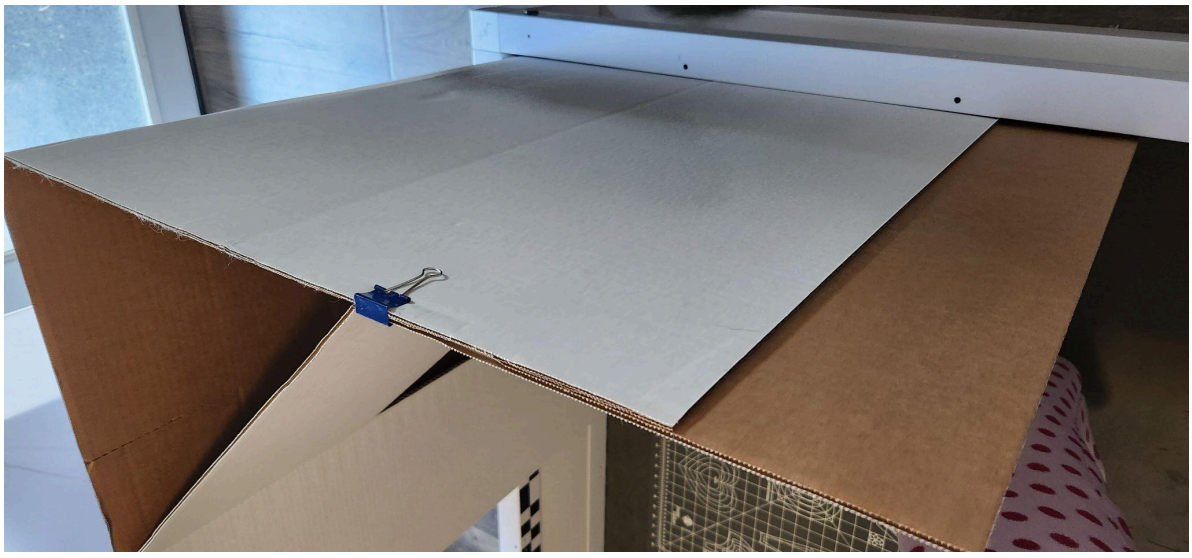
  - Use a utility knife to cut along the marked lines
  - Remove the material from the cut section to create a rectangular opening

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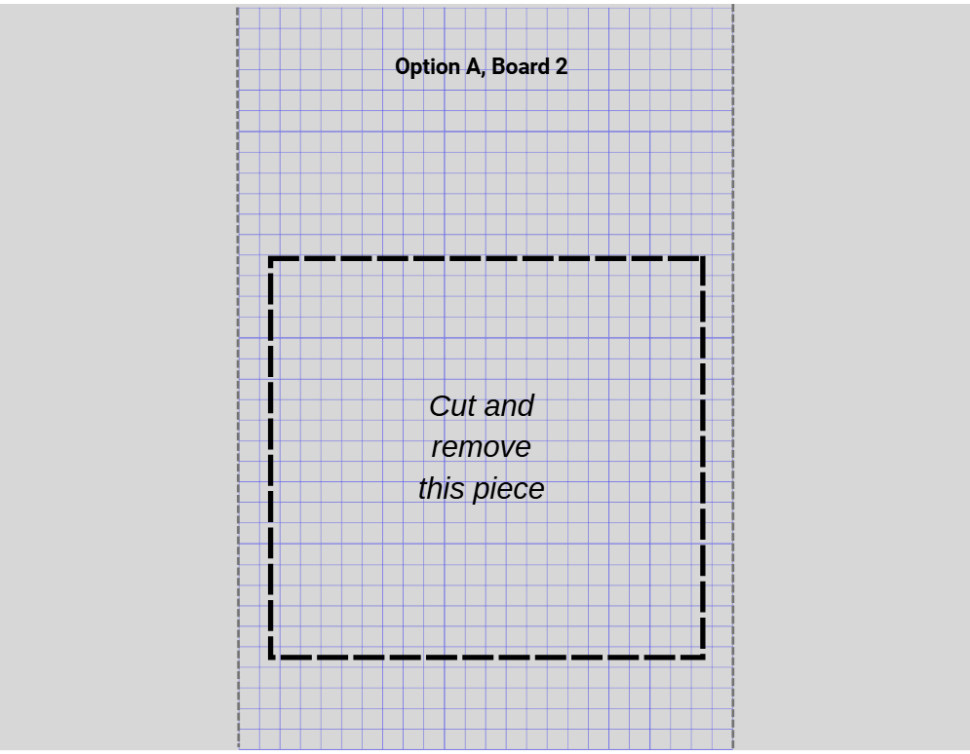
Assembly

- Position board 1 in a corner of the field to hold it in a 90 degree angle
- Use four large binder clips to connect the two panels, with approximately 4.5” of board 2 on each side extending beyond the ends of board 1



- Place the structure into a corner of the field
- If needed, use a hole punch or drill to make holes in the panels near corresponding holes in the perimeter, and connect the goal to the perimeter using long zip ties

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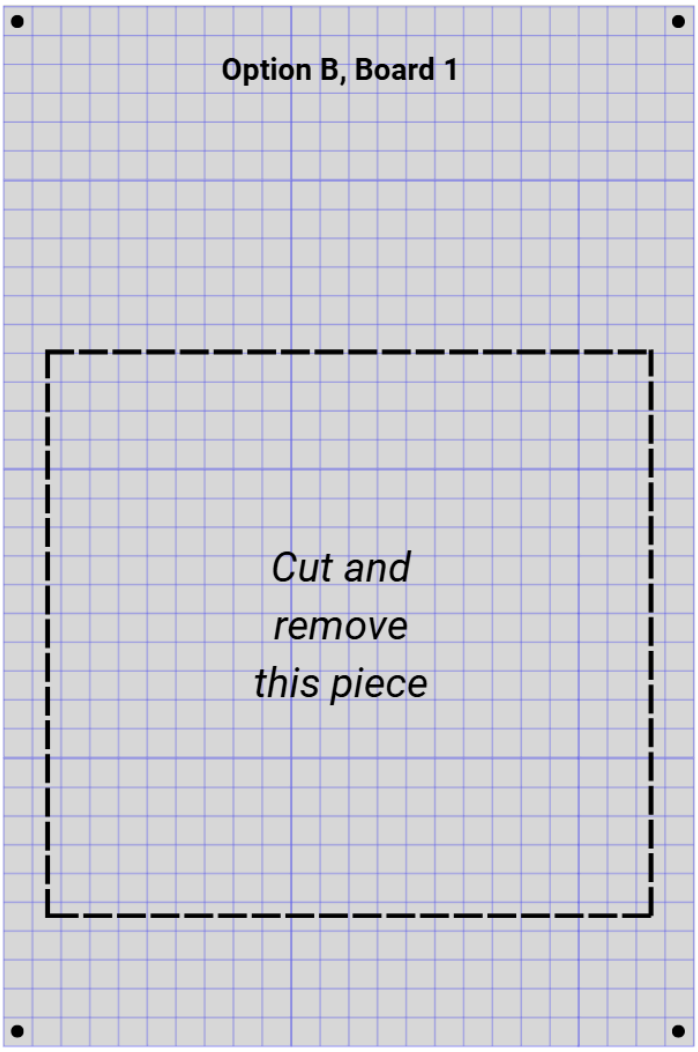


Option B: Structure built from three 2’x3’ coroplast or sturdy cardboard panels

Board 1

- Use a measuring tape/yardstick, straight edge, and pencil to measure and mark the following lines in the center (2’ wide) portion of the board (shown on next page):
  - Horizontal line in parallel with the bottom of the board, 4.5” from the edge of the board
  - Vertical lines 1.5” inside of the edges of the board, beginning at the horizontal line and continuing to a point 24” from the bottom edge of the board
  - Horizontal line connecting the vertical lines at a height of 24” from the bottom of the board
- Use a utility knife to cut along the marked lines
- Remove the material from the cut section to create a rectangular opening
- Use a measuring tape/yardstick, straight edge, and pencil to measure and mark the following locations on the board (shown on next page)
  - 0.5” in at each corner of the board, 0.5” from the top and bottom edges
- Use a hole punch or drill to create small holes in the board at the marked locations

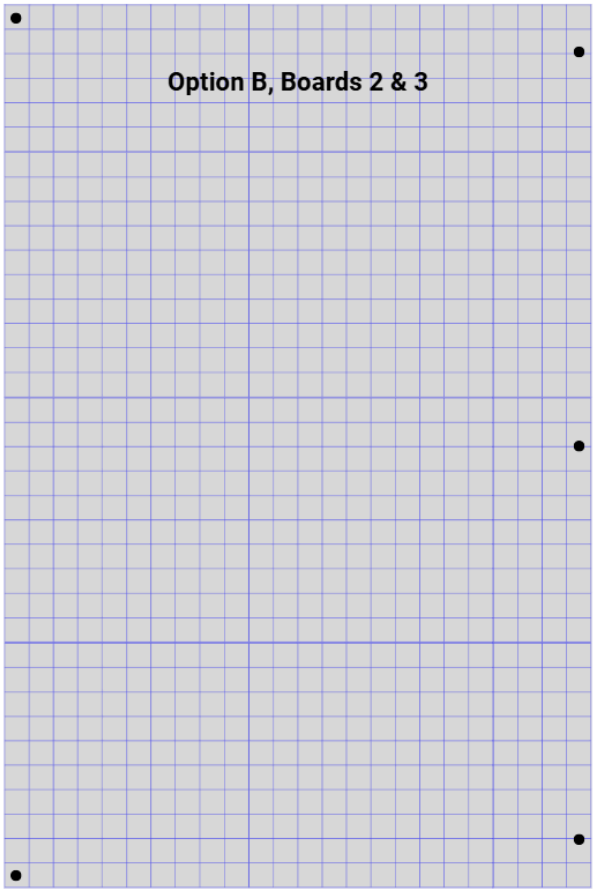
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Boards 2 & 3

- Boards 2 & 3 have symmetrical holes and can be measured & marked identically
- Use a measuring tape/yardstick, straight edge, and pencil to measure and mark the following locations on each board (shown on next page)
  - 0.5” in from one long edge of the board at heights of 2”, 18”, and 34” from the bottom edge
  - 7” in from the other long edge of the board at locations 0.5” from the top and bottom edges
- Use a hole punch or drill to create small holes in the board at the marked locations

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Cut and hole markings for board 1 (left) and boards 2 & 3 (right)

Assembly

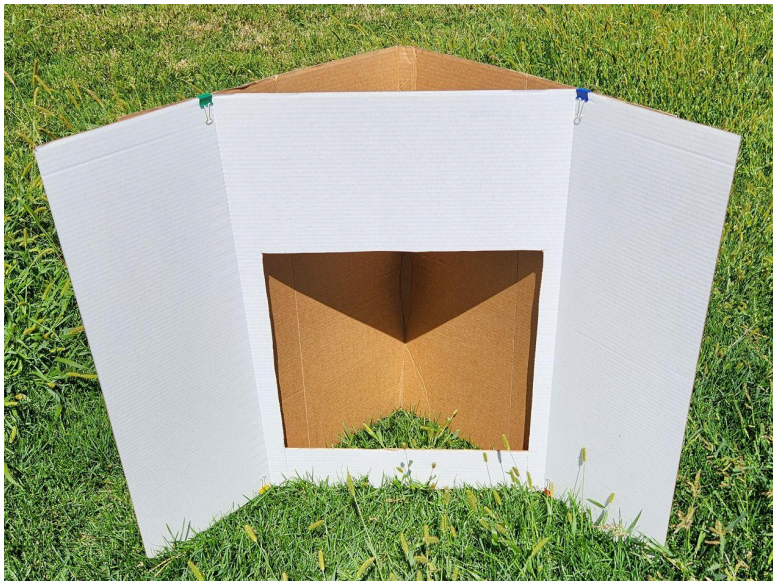
- Use medium-length zip ties to connect boards 2 & 3 together through the holes at 2”, 18”, and 34; the panels should come together in a 90 degree angle, and the zip tie connector should be on the back side of the boards
- Use medium-length zip ties to connect board 3 to the assembly through the holes at each corner of board 3 and the holes 7” in on the top and bottom of boards 1 & 2
- Place the structure into a corner of the field
- If needed, use a hole punch or drill to make additional holes in panels 1 & 2 near corresponding holes in the perimeter, and connect the goal to the perimeter using long zip ties

2.4 Balls

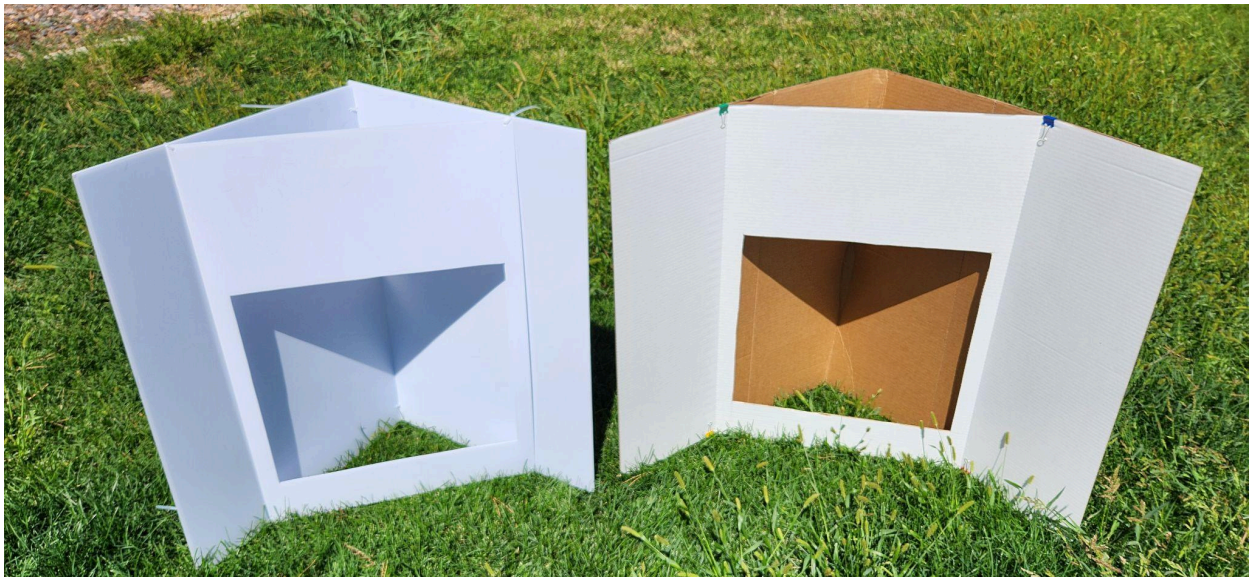
Place 30 balls on each half of the field, and push them as close to the divider as possible at the beginning of the match. Because they’re round, it’s likely they’ll roll some distance away from the divider; as long as they stay in the level 3 goal zones, they don’t need to be reset.

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Photos of completed goals, Options A (tri-fold boards) & B (coroplast boards)







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