# 2026-2027 AgRobotics Contest Rulebook

## SECTION 1. INTRODUCTION AND CONTEST ADMINISTRATION

### Contest Overview

The AgRobotics contest is a robotics competition where teams design, build, and program a Lego robot to complete challenges autonomously and score points in a timed match. The theme and challenges change each year, but all are focused on some aspect of agriculture.
Each team will decide on their challenge strategy and will launch their robot from a designated home base. The robot will be programmed to move outside of that base and attempt to complete challenges within the given timeframe.

### General Rules

Contest officials reserve the right to make updates to these rules throughout the year as needed and without advance notice. Contest officials may clarify rules during the contest in order to maintain the intent, objectives, and integrity of the game.

## SECTION 2. CONTEST FORMAT, ADVANCEMENT, SCORING, APPEALS, AND RESULTS

### Contest Format

Each year, a new agricultural theme for this contest series is released in September.
The contest will consist of a set of known and unknown challenges that the robot must be programmed to complete autonomously. This adds an element of unpredictability that mimics real-world conditions, where farmers and agricultural technologists must often adapt to unexpected circumstances.

The design of the game and designated number of challenges will be released in October each year. There will be approximately 5-8 known challenges and 1-4 unknown challenges.

Known challenges will be released in October, and the unknowns will be released on the day of the contest. Unknowns may be different from contest to contest; however, knowns will remain the same throughout the 4-H year.

Teams must build and program their robot for known challenges prior to the contest.
On contest day, the unknown challenges will be revealed, and teams will be given 60 minutes to build, program, and test the robot for known and unknown challenges.

Any updates and rule clarifications will be posted on the same website. Teams are encouraged to check the website prior to each contest. Modifications or clarifications will be highlighted and dated.

Typical Contest Schedule

- Team check-in
- Orientation (30 min)
- Coach Time (10 min)
- Build Time (60 min)
- Match Play
- Announcement of Finalists
- Finals
- Awards

On the day of the contest, teams will practice and compete on the same game table. If a team has to be relocated for finals or some other reason, time will be given to the team to test their robot on the new table.

**Scoring**
Point values for each game challenge will vary depending on the level of difficulty.
Penalties will also depend upon challenge design, but examples may include: knocking over pieces, restricted human interaction with robot or game pieces, excessive retrievals, etc.
Teams will have two preliminary matches, and points from both will be added together.
Additionally, a teamwork score will be assessed by judges during the competition and added to the match total to form the preliminary team score. The preliminary team score determines qualifiers for finals.

The preliminary team score will be carried over to the finals where teams will compete in two additional matches. Those 2 match scores will be added to form the final team score. The top five teams in each age division will advance to the final match. If there are fewer than five teams in an age division, no finals will take place. Places 6 and beyond are determined by the total preliminary team scores. Each contest host determines the number and types of awards given.

**Score Verification and Appeals**
After each match, the team captain must review the scoresheet. If it is accurate, the captain initials to confirm the points awarded. Once signed, the score is final and cannot be appealed.
In instances of scoring disagreements, the captain will be given limited time by the superintendent to plead the team's case. The superintendent's decision, once made, is final.

Contest officials reserve the right to amend scoring mistakes.

Arguments or confrontational behavior with the judge or contest officials any time during the contest is not permitted and the contestant/team in violation will be disqualified.
Video review from any source is not allowed.

**Tie-Breakers**
Tie-breaker procedures/order will be as follows:

- Highest total teamwork score
- Highest total preliminary match scores (does not include teamwork)
- Highest individual preliminary match score
- Contest officials will determine additional measures if a tie persists.

**Match Re-Runs**
A match can only be re-run due to a game piece malfunction/breakage. It is the responsibility of the team to ensure the game table and its pieces are ready for match. If a game piece was out of place or missing at the time of team-ready status, no re-run will be awarded. If a re-run is awarded by contest officials, the team will forfeit all points awarded in the match in question.

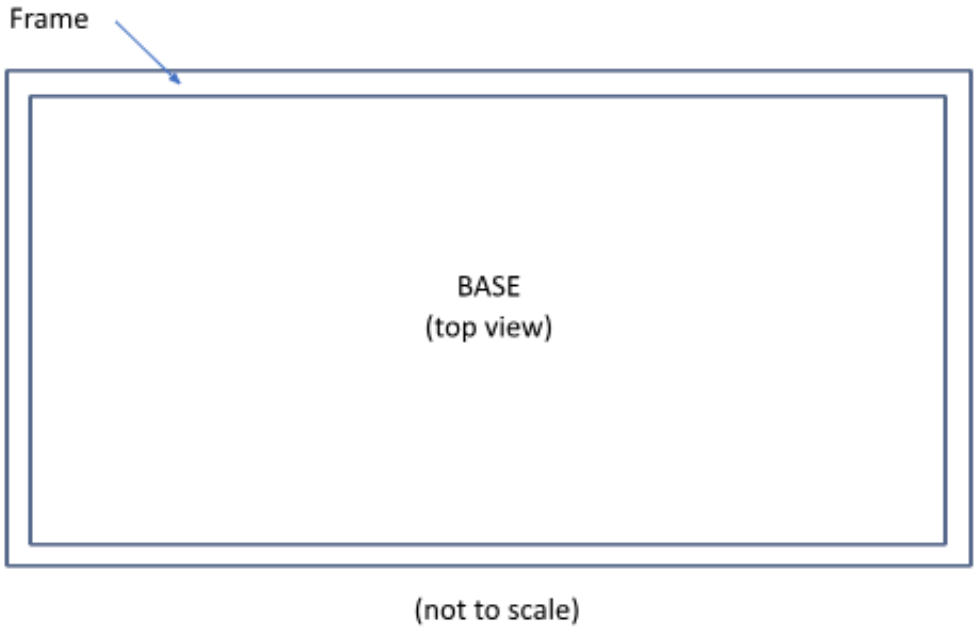
**Results**
The contest results, as announced, are final.
Final rankings will be shared with the contest host for them to post or distribute following the contest.

## SECTION 3. FIELD, TABLE, GAME MAT, AND DEFINITIONS

### Game Table

The game table consists of two parts:

- Base – made of 4’x8’ sheet of plywood or comparable material.
- Rectangular Frame – made of 2”x4” (actual dimensions are 1.5” x 3.5”) lumber attached on top of the base. The inner dimensions of the frame are 45” x 93”.




### Resource Tray

One or more plastic trays will be located outside and next to the game table. The trays will hold additional game pieces used during the match. Contestants can pick up or place game items into the resource tray once the match begins. Teams may place those game pieces onto their robot or in the Player Zone (see definition below) as allowed. Neither the tray(s) nor the game pieces it holds are part of the playing field.

### Game Mat

A vinyl game mat will be placed flat inside the frame of the game table. The game mat will be approximately 45” x 93”. It will generally consist of a Player Zone and Robot Zone.

### Player Zone

The area where the robot must launch from. There is typically only one player zone, but there may be more depending on the game design. This is an area where game pieces may be collected from and/or placed upon the robot for retrieval/delivery.

### Robot Zone

The area outside of the player zone where the robot performs its tasks autonomously. Players are not allowed to touch game pieces.

## SECTION 4. ROBOT EQUIPMENT AND ALLOWED MATERIALS

### Robot Equipment Requirements

1. Each team must supply their own equipment. Each team may only bring the items and respective maximum quantity listed in the table below. Any extra equipment or item that does not meet specifications will be returned to the team coach. No infrared beacons (remote) or sensors allowed.
2. All kit pieces must be in their original factory condition.
3. No 3D printed pieces are allowed.
4. Teams may use any software that facilitates autonomous movement of the robot, so long as the robot is solely controlled by the programs stored on the HUB or microSD card.
5. No remote controllers of any type are allowed.
6. No computers or tablets may be brought up to the game tables during Build Time or Match Play. Programming must take place at each individually assigned team “pit” table.
7. Note paper may only be used for note-taking purposes only. Teams may bring notes to the game table during matches. The paper is not allowed to be used for any other purpose (used on the robot for example).

Teams are not allowed to bring their own game mat and/or pieces to the competition.

| ITEM | QUANTITY |
|---|---|
| Lego Mindstorm EV3*, Spike Prime, Inventor, or Pitsco Titan hub | 1 |
| Portable, battery powered AC power station (must fit under table work station) | 1 |
| 3-pronged extension cord up to 25' (venue will not guarantee power access at any contest) | 1 |
| Plastic container or cardboard box for transporting robot and attachments to and from game area | 1 |
| Laptop computer or tablet with programming software | 2 |
| Lego® Mindstorm® EV3, Spike Prime, Inventor or Pitsco Titan building pieces (excludes hub) | Unlimited |
| Backup Battery (Robot or Laptop) | Unlimited |
| Motors | Unlimited |
| Sensors | Unlimited |
| USB cable | Unlimited |
| Build Plans (paper or digital) | Unlimited |
| Ruler or tape measure | Unlimited |
| Pencil/pen and notepad for design and note-taking purposes | Unlimited |
| Digital or printed game rules (study guides may not be used during match play) | Unlimited |

*Note: Lego EV3 software/firmware is no longer updated by Lego. Use at your own risk.

## SECTION 5. BLUETOOTH, INTERNET, SOFTWARE, AND CONNECTIVITY

### Bluetooth and Internet Connectivity

1. Bluetooth connections can be made and utilized during Build Time. It is not allowed during the Match Play or Finals while the robot is on the playing field.
2. No internet connectivity will be provided.
3. Teams should have all programs stored locally on their device(s).
4. Teams are HIGHLY encouraged to ensure their computers' operating system, software/app, and robot firmware are up to date prior to the contest.
5. When teams check-in and are assigned to their "pit", members and their coach should test and resolve any connectivity/pairing issues.
6. Contestants should be well-trained on how to resolve Bluetooth or USB connection issues.
7. Teams are encouraged to create a unique name for their hub so that pairing is less confusing and will minimize any mistaken pairings with other robots/computers.
8. Any team that intentionally connects to another team's robot is subject to disqualification.

## SECTION 6. INSPECTION, ROBOT SIZE REQUIREMENTS, AND MATCH PREPARATION

### Match Setup and Inspection

1. Before the match begins, the robot and all its attachments must be placed and fit into the boundary of the Player Zone for inspection by a contest official. The zone's boundary is the outer edge of the colored line.
2. The Player Zone is 20"x17"x15" (length/width/height).
3. To pass inspection, the robot and ALL attachments may not break the plane of the Player Zone boundary nor be taller than 15 inches from the surface of the game mat.
4. Once the official inspects and approves the size of the robot, team members may set up their robot to prepare for the match.
5. At all times during the match, the robot (including attachments) must not exceed the 20"x17" x15" (length/width/height).
6. No game pieces found in the Resource Tray may be touched until the match begins. The tray may not be used by the robot nor placed on the game table for any reason.
7. Contest officials reserve the right to remeasure the robot after a match. Any robot deemed to exceed the dimensions will forfeit the match.

## SECTION 7. MATCH PROCEDURES AND GAMEPLAY

### Robot Operation

1. The robot must be programmed to perform all challenges autonomously.
2. All parts of the robot, attachments (see Match Setup rule 5), and game pieces must completely fit within the Player Zone each time the robot is launched from the Player Zone. The zone's boundary is the outer edge of the colored line.
3. Teams must pre-build and program a robot prior to the competition.

### Check-In and Team Pit Procedures

1. Teams will report to the designated location and time for check-in and submit their robot and additional pieces/equipment for initial inspection.
2. After check-in, each team will be directed to a team pit (table and chairs) where they can work on their robot and programming. In some cases, teams may have to share a table with another team.
3. In some contests, electricity may be available but not guaranteed. Teams should bring a portable battery powered AC power station.
4. An orientation will be provided for all participants where superintendents will review the challenges, rules, and scoring.
5. After orientation, each team will have 60 minutes of Build Time for additional designing, building, programming and testing of their robot.

### Practice and Competition Tables

1. Teams will practice and compete on the same game table. In the case where a team has to move tables (example: due to table damage), teams will be given a designated amount of time to practice on the new table.
2. If time permits, teams are allowed to make alterations to their robot design and/or program between matches.

### Match Reporting and Ready-State

1. When match play begins, teams must report immediately to the game table when called. The robot must be powered up and ready for inspection when they arrive at the game table. Failure to report to the game table and/or get the robot and game table/pieces to a ready-state in a timely manner may result in the team forfeiting the match. See ready-state steps below.
    - Team members place robot with attachments in Player Zone for measuring.
    - Team members ensure robot is powered up and ready.
    - Team members check the game table to ensure all pieces are accounted for and in their correct positions.
    - No game pieces may be pre-loaded prior to the match.
    - Team members give the judge(s) a thumbs up to indicate ready-state.
    - Judge gives thumbs up to timekeeper/announcer signifying the team and playing field is ready.
    - Timekeeper/announcer will announce "3, 2, 1, begin" to start the match.

**Equipment Malfunctions**

1. Teams that experience equipment malfunction(s) may not replace the equipment with supplies outside the contest area (from leaders, volunteers, CEA, AST, or contest officials).
2. Instead, team members must work together and be creative in completing preparations without the malfunctioning/missing equipment or visit with other teams to borrow the needed part.

**Non-LEGO Components**

1. Depending on the challenges, contest officials may allow or require teams to use non-kit items in the design of the robot.
2. In such cases, details will be outlined in the game release and/or orientation.

**Match Timing**

1. A match will be 4 minutes in length.
2. The official timekeeper and announcer will have a countdown to start and stop the match.
3. Any activities performed by the robot after time has been called will not count for points.

**Placement of Structures and Game Pieces**

1. Human players may not place game pieces or team-built structures into the ROBOT ZONE.
2. These items may only enter the ROBOT ZONE if placed there autonomously by the robot, or unless otherwise permitted by the challenge rules.
3. When allowed by challenge rule, any Lego container used in the delivery of a game piece is subject to the same boundary and/or placement rules as the game piece itself.
4. If any part of a Lego container is out of bounds, then all of the game pieces inside the container are also deemed out of bounds.

**Match Re-Runs**

1. A match can only be re-run due to a game piece malfunction/breakage.
2. It is the responsibility of the team to ensure the game table and its pieces are ready for match.
3. If a game piece was out of place or missing at the time of team-ready status, no re-run will be awarded.
4. If a re-run is awarded by contest officials, the team will forfeit all points awarded for the match in question.

## SECTION 8. RETRIEVAL, POSSESSION, AND HUMAN INTERACTION

1. Contestants may retrieve their robot at any time during the match without penalty. After retrieval, the robot must be returned to the PLAYER ZONE before play resumes (see Rule 3 regarding proper retrieval). Robot parts that become completely detached from the main body of the robot while in the ROBOT ZONE may also be retrieved without penalty, provided the detached part is not in possession of a game piece. Contest officials will not assist with any retrievals.
2. Contestants may retrieve their robot at any time during the match to restart or re-attempt challenges. During retrieval, contestants must not manipulate, interfere with, or intentionally redirect any game piece on the playing field unless the game piece is in the robot's possession. Contestants who alter the position or orientation of game pieces during retrieval may be assessed penalties or disqualified from the match.
3. Possession is defined as a game piece that is not touching the playing surface and is under the control of the robot. Items in possession of a robot may be retrieved once any part/piece of the robot has broken the plane of the PLAYER ZONE boundary.
4. If the robot is in possession of a game piece in the ROBOT ZONE, and the robot is retrieved by the player, the game official will return the game piece(s) to its original location/state.
5. A robot that has possession of a game piece may be retrieved during the match. A robot that loses possession of a game piece during the match (ie - robot drops piece outside of the PLAYER ZONE) the piece can no longer be retrieved by contestants.
6. A player is not allowed to touch any game piece except when the piece is completely inside the PLAYER ZONE boundary, OR if the robot is deemed in the PLAYER ZONE AND in full possession of a game piece(s). Once the piece is deemed inside the PLAYER ZONE, contestants may remove the game piece from the game table/robot and store it in the RESOURCE TRAY.
7. Players touching a game piece in the ROBOT ZONE is not allowed. If a contestant intentionally touches a game piece in the ROBOT ZONE, the team will be given a 100-point penalty per occurrence per piece. In such cases, the piece will be returned by a table judge as quickly as possible to its original starting point and orientation. A touch penalty negates an autonomous objective. All game pieces must be in place at the beginning of the match. All game pieces that are secured to the game mat or table may not be intentionally dislodged and/or moved. Doing so will result in forfeiture of the match. Touch penalties cannot be protested.

## SECTION 9. CONDUCT, COMMUNICATION, SPECTATORS, COACHES, AND SPORTSMANSHIP

### Team Member Access

1. All competing team members are allowed around the game table during competition, and any member may touch the robot when necessary.
2. Teams not competing must remain at their tables or designated staging area.

### Sportsmanship

1. Good sportsmanship is always expected. This is crucial during practice times. Practice time on the game table may be limited as build time progresses.

### Contest Area Access

1. Only registered contestants and designated contest officials will be allowed in the robotics challenge pit areas.
2. Due to space limitations, parents and other spectators must remain outside the designated contest area.
3. Spectators may be allowed to enter the contest area during finals.

### Coach Interaction

1. Coaches will be permitted to meet with their team for a 10-minute time period prior to build time and following orientation.
2. This time should be used to help team members develop a plan and foster positive youth development and to ensure proper Bluetooth/USB connections.

### Communication Devices

1. No cell phones or other types of communication devices are allowed in the pit or contest areas. Exceptions include medical devices.

### Communication Restrictions and Disruptive Conduct

1. During Build Time and Match Play, contestants are not allowed to communicate with anyone outside of the contest (coaches, parents, siblings, etc.). Exceptions include medical emergencies. Contestants are welcome to ask questions to contest officials or other contestants. Any spectator or contestant in violation is subject to being removed from the contest or spectator area, which could also result in team/member disqualification.
2. Any contestant, coach, or spectator that becomes disruptive or does not exhibit sportsmanship, may be removed from the contest area at the sole discretion of contest officials and/or show (host) management.

### Pit Area Cleanup

1. Teams must clean up their pit areas prior to the awards ceremony. Teams not advancing to finals are free to leave once their pit area has been cleaned and are dismissed by contest officials.

**Final Rankings**

1. Following the conclusion of the contest, final scores/rankings will be shared with the contest host for them to post or distribute following the contest.

# Farming Forward:  Celebrating 250 Years of Agriculture Innovation

**Introduction**

Welcome to Farm Forward, where innovation meets history! Throughout history, agriculture has continually evolved through groundbreaking inventions, scientific discoveries, and technological advancements that have transformed how we produce food, fiber, and fuel. This year's AgRobotics challenge takes teams on a journey across the major eras of agriculture—from the earliest irrigation systems and animal-powered plows to the cotton gin, barbed wire, tractors, precision agriculture, drones, and beyond. Along the way, teams will use creativity, engineering, and autonomous robotics to recreate some of the most significant milestones that shaped modern agriculture. As you solve each challenge, you'll discover how centuries of innovation have helped feed a growing world and imagine the technologies that will define the next era of agriculture. Good luck, and enjoy the journey through agricultural history!

**Known Objectives**

- Hay There!
- Power by the Pail
- Soybean Shuffle
- Boll on a Roll
- Pick, Pack & Store
- Precision Path

## 2026-2027 Game Mat Design/Layout




The game mat image shown above is available for teams to download (**PDF**) and printed at a source of their choosing. It will also be available to order at Geyer Instructional Products (search "AgRobotics"). Direct link to the game mat: **LINK**

There are three separate Player Zones for this game which includes:

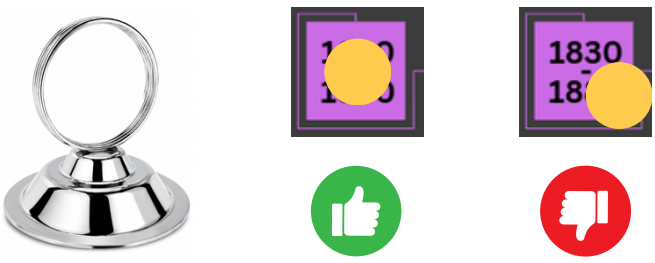
- Food for my Community (aka Community Zone)
- Food for my Country (aka Country Zone)
- Food for my World (aka World Zone)

All robots must start in the designated zone outlined for each objective. Robots may pass into or through other Player Zones.

Everything outside of those three zones is considered the Game Zone.

### Timeline Tokens

New this year is the introduction of Timeline Tokens (see photo below). Teams can earn access to these by earning points for designated known or unknown objectives. Teams are not allowed to move a token until it is earned. There are up to 6 tokens available in each match. Tokens will be placed on the numbered circles located near the PLAYER ZONES. The ring on top of the game piece will be oriented parallel to the long wall of the game table. When earned, robots must retrieve and deliver each token autonomously. When delivered to the proper location on the timeline, the team earns bonus points. When delivered, the token must be placed completely inside the correct colored ERA square on the north border of the mat (example diagram below). Moving any unearned token where the base is completely outside of the original numbered circle will negate the team's ability to earn the token.



**Known Objective 1: Hay There!**

**Description**

The horses have been working hard all season helping the farmer prepare fields, pull equipment, and transport supplies around the farm. After a long day of work, it's time to reward them with a fresh supply of hay. Three square hay bales are waiting in the hay meadow, ready to be gathered. As the farmer, your robot must travel to the meadow, collect the hay bales, and deliver them to the horse barn so the animals can be fed. Careful planning and efficient transportation will help ensure the horses receive their hay before the day is done.

**Setup:** 3 plastic hay bales will be placed on the 3 dots located in the **Hay Field** (as oriented in the diagram below) at the beginning of the match.



**Player Zone for Objective 1:** Community Zone (see page 4 for definition)
No LEGO containers/structures may be left behind in this challenge.

**Scoring Rules:** The robot must collect bales from the **Hay Field** and deliver bales to the **Horse Barn**. When placed in the **Horse Barn** zone, the bales must be completely inside the zone's boundary, not breaking the plane of the light green background. Bales may be placed in any arrangement within the zone. Points will be awarded once the game piece(s) have been successfully delivered AND the robot has completely exited the Horse Barn.

**Points:**

Not completed or attempted = 0 points
Each delivered bale = 50 points
All 3 bales delivered = 100 point bonus
Robot returned from **Horse Barn** to **Community Zone** autonomously = 150 point bonus (defined as the entire robot including attachments completely inside the **Community Zone**)
Total Possible Points = 400 points





**Known Objective 2: Power by the Pail (Token Task)**

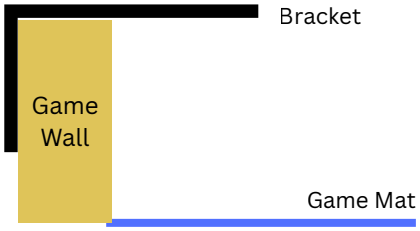
**Description**

In 1859, Thomas Aveling developed one of the first practical self-propelled steam-powered agricultural engines, helping usher farming into a new era of mechanization. These powerful machines could pull heavy equipment and perform jobs that once required teams of horses, but their steam engines needed a reliable supply of water to keep working. The farmer's steam tractor is running low on water, and the nearest supply is the river across the farm. As the farmer, your robot must travel to the river, collect the bucket of water, and safely deliver it to the steam-powered tractor. Keep the water moving and the steam flowing so the farmer can get back to work!

**Setup:** One metal bucket will be placed on the dot located in the **River Zone** (as shown in the diagram below) at the beginning of the match. The handle for the bucket will be glued in an upright position (see example photo below) and oriented in a left to right fashion at the beginning of the match. For seniors only, there will be an L bracket secured onto the wall of the game table (see diagram below) and centered on the red arrow printed on the game mat.








**Player Zone for Objective 2 & Token 1:** Community Zone (see page 4 for definition)
No LEGO containers/structures may be left behind in this challenge.

**Scoring Rules:** The robot must retrieve and deliver the bucket from the River Zone to the **Steam Tractor** zone. Points, and access to Token 1, will be awarded once the game piece has been successfully delivered AND the robot has completely exited the **Steam Tractor** zone.

**Juniors:** The bucket must be placed completely inside the zone's boundary and not touching the light green boundary. The bucket must rest on its base in a generally upright position and may not be supported by the robot or a team-built structure.

**Seniors:** The bucket must be hung by its handle onto the L Bracket.

**Points:**

Not completed or attempted = 0 points
Bucket delivered = 250 points and Token 1 unlocked (see page 14 for rules)
Token 1 Delivery Bonus = 500 points (when delivered to 1830-1880)
Total Possible Points = 750

**Known Objective 3: Soybean Shuffle**

**Description**
The growing season has come to an end, and the farmer's soybean crop is ready for harvest! Soybeans have become one of America's most important crops, providing ingredients for livestock feed, cooking oil, biodiesel, and countless other products. Before the next crop can be planted, the farmer needs to get this year's soybeans safely out of the field and into storage. As the farmer, your robot must travel to the soybean field, harvest the soybeans, and transport them to the grain silos for storage. Gather as much of the crop as you can and get it safely into the silos—the success of the harvest depends on you!

**Prerequisite:** Points must have been earned from either Objective 1 or 2.

**Setup:** Eleven plastic pawns representing soybeans will each be placed and centered on the 11 dots located in the **Soybean Field** at the beginning of the match.

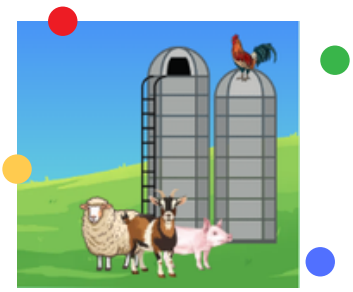


**Player Zone for Objective 3:** Country Zone (see page 4 for definition)
Placement of Structures and Game Pieces rules in effect, see page 9 for definition.

**Scoring Rules:** The robot must collect and deliver soybeans from the **Soybean Field** to the **Silo Zone**. When placed in the **Silo Zone**, the soybeans must be completely inside the zone's boundary. The zone's boundary is the outer edge of the rectangular graphic, not breaking the plane of the light green background. Pieces may be placed in any arrangement within the boundary. Points will be awarded once the game piece(s) have been successfully delivered AND the robot has completely exited the Silo Zone.

**Points:**
Not completed or attempted = 0 points
Each delivered piece = 50 points
All 11 pieces delivered = 450 point bonus
Total Possible Points = 1,000





**Known Objective 4: Boll on a Roll (Token Task)**

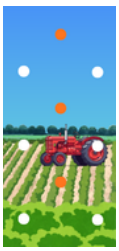
**Description**

The cotton crop is ready for harvest! In 1793, Eli Whitney invented the cotton gin, a machine that dramatically sped up the process of separating cotton fibers from their seeds and transformed cotton production in the United States. But before the gin can do its work, the freshly harvested cotton must first make its way out of the field. As the farmer, your robot must travel to the cotton field, harvest the mature cotton, and safely transport it to the cotton gin for processing.

**Prerequisite:** Points must have been earned from either Objective 1 or 2.

**Setup:** Nine weighted ping pong balls (6 white and 3 orange) will be placed on the 9 matching colored dots located in the **Cotton Field** at the beginning of the match. 1/2" hex nuts will be super glued onto the ping pong balls (as depicted in the image below). The white ping pong balls represent cotton bolls that are ready to harvest. Orange ones represent immature cotton bolls that must not be harvested.





**Player Zone for Objective 4 and Token 3:** Country Zone (see page 4 for definition)
No LEGO containers/structures may be left behind in this challenge.

**Scoring Rules:** The robot must collect and deliver the mature cotton (white pieces) from the **Cotton Field** to the **Cotton Gin** for processing. When placed in the **Cotton Gin**, scoring will be determined by the location of the hex nut, which must be completely inside the zone's boundary. The zone's boundary is the outer edge of the rectangular graphic. No LEGO containers/structures may be left behind in this challenge. Pieces may be placed in any arrangement within the boundary. Moving any immature (orange) cotton where the nut is completely outside of the orange dot will result in a penalty. Points, and access to Token 3, will be awarded once the game piece has been successfully delivered AND the robot has completely exited the Cotton Gin zone.

**Points:**

Not completed or attempted = 0 points
Each white piece delivered = 100 points and delivering at least one earns Token 3 (see page 14 for rules)
Token 3 Delivery Bonus = 1,000 points (delivered to 1780-1830)
Total Possible Points = 1,600
Penalty for moving immature cotton = -200 points each (assessed at the end of the match)






**Known Objective 5: Pick, Pack & Store**

**Description**

The apple crop is ripe and ready for harvest! For generations, farmers have carefully picked fruit at just the right time to ensure it reaches consumers fresh and in good condition. Modern technology, like rapid cooling and controlled-atmosphere storage systems, can extend the freshness of apples so they can be enjoyed by consumers year-round. As the farmer, your robot must travel to the apple orchard, harvest the apples, and transport them back to the packing area. Once collected, the apples must be placed into containers to protect them during handling and transportation. Your robot must then deliver the filled containers to the climate-controlled warehouse, where the apples can be safely stored until they are ready to be shipped to market. Work carefully and efficiently—the harvest isn't complete until the apples are packed and safely in storage!

**Prerequisite:** Points must have been earned from either Objective 3 or 4.

**Setup:** A spice rack organizer will be placed on the Warehouse Shelves placeholder on the game mat and against the wall of the game table. Nine 1" foam (red, yellow, and green) blocks representing varieties of apples will be placed on matching colored squares within the Apple Orchard at the beginning of the match. Nine containers (net pots) will be placed in the Resource Tray at the beginning of the match.

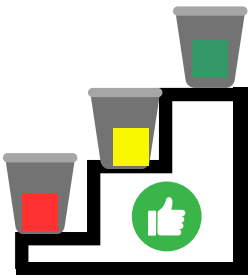


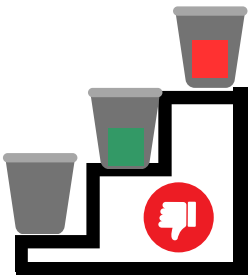
**Player Zone for Objective 5:** World Zone (see page 4 for definition)
Placement of Structures and Game Pieces rules in effect, see page 9 for definition.

**Scoring Rules:** The robot must collect the apples and return those to the **World Zone**. After apples have been retrieved, players must hand-place an apple inside each of the net pots (1 apple per pot) and then the robot delivers the filled pots to the **Warehouse Shelves**. When delivered, **each filled** pot must be placed in an upright position, completely resting on the black surface of the shelf, and in the following arrangement:

- Pots with red apples (block) = bottom shelf
- Pots with yellow apples (block) = middle shelf
- Pots with green apples (block) = top shelf

Points will be awarded at the end of the match.





**Points:**

Not completed or attempted = 0 points
Each correctly placed container = 250 points
All 9 filled containers delivered = 750 point bonus
Total possible points = 3,000

**Known Objective 6: Precision Path (Token Task)**

**Description**
By the late 1990s, GPS technology was beginning to transform how farmers navigated their fields. In 1997, a prototype tractor demonstrated automatic steering along a GPS-defined straight path, helping pave the way for the automated guidance systems widely used in agriculture today. Modern guidance systems allow tractors to follow precise routes while planting, spraying, fertilizing, and performing other field operations with greater accuracy. In this challenge, your robot will take on the role of a GPS-guided tractor. Using its line-following skills, the robot must autonomously follow the prescribed route across the farm to the Irrigation Zone, where it will deliver bags of fertilizer in preparation for the next crop. Stay on course and make an accurate delivery—precision is the key to preparing the field for a successful growing season!

**Prerequisite:** Points must have been earned from either Objective 3 or 4.

**Setup:** Two bean bags (fertilizer) will be placed in the **Resource Tray** at the beginning of the match.

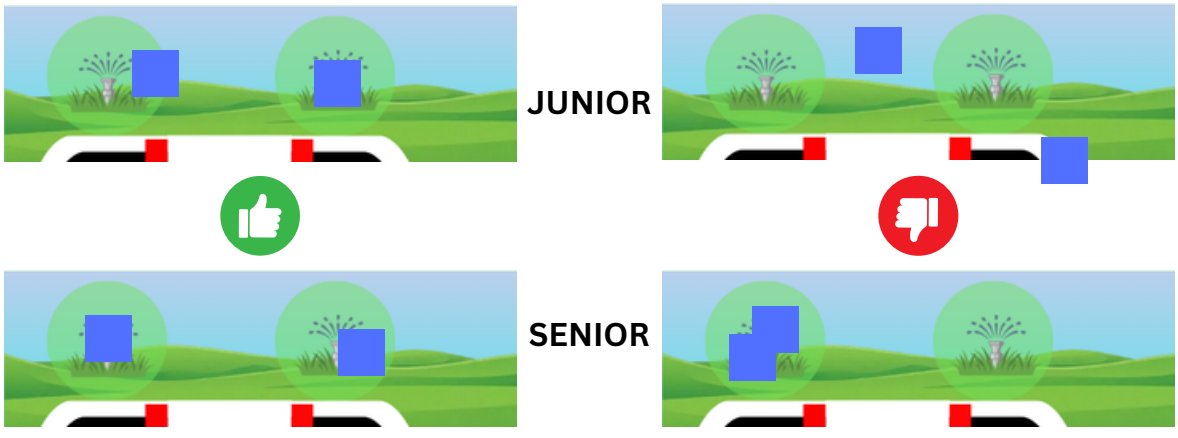
Player Zone for Objective 6 and Token 5: World Zone (see page 4 for definition)
Placement of Structures and Game Pieces rules in effect, see page 9 for definition.

**Scoring Rules:** The robot must travel using a line-following program along the black line (may use either end of the line as the starting point), stop and deliver the bags into the **Irrigation Zone**, and return to the **World Zone** (autonomously). Points, and access to Token 5, will be awarded once the fertilizer has been successfully delivered AND the robot has autonomously and completely returned to the **World Zone**. The robot must use a sensor to continuously detect and follow the black line.

**Juniors:** bags must be placed anywhere inside the entire **Irrigation Zone**.

**Seniors:** One of the bags must be placed inside each of the designated green circles within the Irrigation Zone. If more than one bag is touching the same circle, neither will count for points.

**Points:**
Not completed or attempted = 0 points
Each delivered bag = 250 points and Token 5 unlocked (see page 14 for rules)
Token 5 Delivery Bonus = 1,500 points (when delivered to 1990-2000)
Total Possible Points = 2000



## Game Piece Supply List

Teams are welcome to secure exact or comparable game pieces from other vendors for practice and/or economical reasons. Some items are being recycled from prior years, so check your supplies.

| Product Description | Number of Pieces Used in the Game | Suggested Purchase Link |
|---|---|---|
| 1" Foam Blocks | 9<br>(3 red, 3 green and 3 yellow) | LINK |
| Game piece pawns | 11 | LINK |
| Plastic square bales | 3 | LINK or LINK or Amazon |
| L Bracket | 1 | LINK |
| Metal Bucket | 1 | LINK |
| Ping Pong Balls | 9 (6 white; 3 orange) | LINK |
| 1/2" hex nuts | 9 | LINK |
| 3M Command Strips (for L bracket) | As needed | LINK |
| Spice Rack Organizer | 1 | LINK |
| Net Pots | 9 | LINK |
| Bean bags | 2 | LINK |
| Place Card Holder | 6 | LINK |

Amazon Shopping List: https://a.co/05Qb9FjW

## APPENDIX A. COACH'S PRE-CONTEST CHECKLIST

**The following checklist is provided to help coaches ensure their team is prepared prior to arriving at the contest.**

### Robot

□ Robot is fully assembled.
□ Robot fits within the maximum size requirements.
□ All attachments have been tested.
□ Hub battery is fully charged.
□ Backup batteries are packed.
□ Robot firmware is current.
□ Robot name has been changed to a unique Bluetooth name.

### Programming

□ Programs have been downloaded to the Hub.
□ Backup copies of all programs are saved.
□ Team understands how to download programs without coach assistance.
□ Team understands how to reconnect Bluetooth if pairing is lost.
□ Team understands how to connect using USB if necessary.

### Computer / Tablet

□ Laptop(s)/tablet(s) fully charged.
□ Chargers packed.
□ USB cable packed.
□ Programming software opens correctly.
□ Operating system updated.
□ Robot firmware updated.

### Equipment

□ All robot pieces packed.
□ Motors packed.
□ Sensors packed.
□ Build plans (if used) packed.
□ Measuring device packed.
□ Notebook and pencils packed.
□ Portable battery power station packed (recommended).
□ Transport container packed.

**Contest Readiness**

□ Team understands contest schedule.
□ Team understands inspection procedures.
□ Team understands retrieval rules.
□ Team understands possession rules.
□ Team understands Bluetooth restrictions.
□ Team understands communication restrictions.
□ Team understands scoring procedures.
□ Team understands tie-breakers.
□ Team has reviewed the current year's game rules.

**Final Questions**

Before leaving for the contest, ask your team:

□ Does your team have all the parts to their kit/laptop/tablet? (cables, chargers, batteries, etc.)?
□ Does their robot connect to the computer/tablet via Bluetooth or USB?
□ Can your team download programs onto their robot?
□ Does anything need charging?