IV MESA Olympiads
Imperial Valley Robotics Competition
2026-2027
Date: January 16th, 2027

Level: High School
Type of Contest: Team
Composition of Teams: 3 – 5 Students per team

Background: Welcome to the IVMESA Olympiads 2027! We are thrilled to have your team participate in our triathlon, where teams will showcase their mechanical and technical skills!

Challenge: Teams will design a robot that can collect as many golf balls and score them in the center structure, along with facing several obstacles and challenges.

*The purpose of the competition is to encourage **gracious professionalism** that leaves everyone involved feeling valued with a sense of integrity and teamwork. The goal is not just to win, but also to participate fairly and to extend the gracious professionalism and respect to all teams and students involved.*

- *For Inspiration and Recognition of Science and Technology (FIRST)*

Definitions:

- Autonomous: Mode in which the robot moves independently without human control.
- Teleoperation: Mode in which the robot moves through human control (ie, remote control)

Robot & Materials:

1. Teams may only use simple materials such as string/zip ties/balsa wood/ rubber bands.
2. IV MESA will only provide the kit/ parts listed below and simple **recyclable materials**.
3. All teams will receive a VEX EXP kit provided by the Imperial Valley MESA Program. Kits will be provided and assigned by your MESA advisor.
    a. Robotic kits: VEX EXP Robot SKU#: 280-7735. These are the only robotics kit pieces allowed
4. Robots may incorporate a total of **TEN** 3D printed parts
    a. 3D part colors must be different from those already used in the VEX kit.
5. Teams may not make any alterations to any of the VEX Kit Parts provided by the Imperial Valley MESA Program.
    a. Alterations include: adhesives on kit parts, holes or modifications to kit parts, and or bending kit parts.
    b. NOTE: Robots with alterations will need to be fixed before the competition. If alterations cannot be undone, then the team will not be allowed to compete.
6. There are no dimensional restrictions as to the building of the robot.

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Game Rules:

Round #1

In a teleoperated robot, a human operator controls the movement

1. Robots will compete in this round in teleoperation mode.
2. The objective of Round #1 is to earn as many points as possible. Points will be earned by the number of golf balls scored in the team's assigned basket placed at the center of the field or by the team's goal post. Total points will be calculated at the end of the round (*For field layout see page 10*).
3. Inner barriers will NOT be placed on the field.
4. In order for teams to score points, teams will have to build a device that will deliver golf balls to the team's robot.
    a. The device has no size limitations.
    b. The device must use two actions before the golf ball reaches the robot.
    c. The final and second action must end with a ramp or a funnel.
    d. For the first action, teams may use one of the following categories of energy/simple machines:
        i. Springs or rubber bands (e.g., tension springs, bungee cords, torsional springs, mousetrap, etc.)
        ii. Levers or pulleys (e.g., seesaw, bottle opener, tongs, fixed pulley, movable pulley, compound pulley, etc.)
        iii. Pressured fluids such as air (No water permitted)
    e. Devices can not touch the field or the robot and must remain outside the field.
    f. Devices may only hover above the field.
    g. Only the human player may load the golf balls onto the device and reset the device.
        i. If the golf balls miss the loading process or a ball falls off the robot, the robot may pick up the balls from the floor.
5. Four colored baskets (blue, red, black and green) will be placed at the center of the field. Teams will be assigned one of the 4 colors as their scoring basket.
6. At the judge's signal, robots will begin to acquire golf balls and attempt to score them into their corresponding basket.
    a. Each team has a total of 20 balls to score in the allotted time.
        i. The robot must score in the group's designated basket to earn points. If the robot accidentally scores in another team's basket, the other team will receive the point.
    b. Robots **MUST NOT** touch the blue line near the center of the field or the basket. Robots are allowed to have parts hover over the blue line and basket as long as no contact is made and all four wheels are behind (examples: arms, elevators, claws, etc).
    c. A green perimeter is labeled on the ground further from the basket. Scoring while behind this green perimeter will earn the team a 2x point multiplier for that specific golf ball. This line may be crossed if the team wishes to bypass the multiplier.
    d. At an estimated 43 inches behind the green perimeter, there will be 3 colored lines. Scoring while behind these lines will earn the team a 3x point multiplier for that specific golf ball. These lines may be crossed if the team wishes to bypass the multiplier.
        i. If a ball scored from either multiplier region lands in another team's basket, the multiplier will be removed from the ball and the points will be awarded to the other team.
    e. Teams have the option to score points into their designated goal post for less points.
7. **ONLY THE ROBOT** will be allowed to score the golf balls into the basket.
8. Teams have the full allotted time to make as many baskets as they can.
9. The round concludes when the time runs out.

Round #2

Autonomous robots have the ability to gain and identify information about their environments

<u>Autonomous Challenge</u>

1. Round 2 has two challenges:
    a. Autonomous: transporting two golf balls to a designated colored drop-off zone.
        i. Obtaining the first golf ball will earn 10 points
        ii. Taking the first golf ball to the drop-off zone will earn 25 points
        iii. Obtaining the second golf ball will earn 15 points
        iv. Taking the second golf ball to the drop-off zone will earn 30 points
        v. for a total of 80 points in this challenge.
    b. Teleoperation: 40 Point Challenge
2. At the Judge's signal, all teams will begin in autonomous mode to complete the two challenges.
3. Inner barriers will be placed on the field to separate the field into 4 playing areas.
4. Before each match, the Judge will randomly assign each robot's starting position within the team's designated playing area.
    a. The robot will be placed on one of the two equally closest corners to the colored basket.
    b. The robot will be placed 6 in away from each wall.
    c. The front of the robot will be faced towards one of the walls. Team's choice.
5. Both the golf balls and the RED drop-off zone will always be placed on the predetermined lines.
    a. Judges will place the RED drop-off zone randomly along the predetermined line. *For specific field layout, see page 7.*
6. There will be a total of 4 golf balls and one marble on the field.
7. Teams will transport the two (2) golf balls closest to the colored basket to the RED drop-off zone.
    a. Both balls may be carried/transported together in a single trip or delivered in two separate trips, in any order the team chooses.The order of the balls transported does not matter.
    b. Any form of transportation of the balls that the robot can perform is allowed (examples: dragging, pushing, lifting, etc).
    c. Points are awarded per ball, independently — a team may earn partial credit if only one of the two balls is successfully transported and confirmed.
    d. After the ball(s) are delivered, the robot must make a sound and/or remain near the RED drop-off zone for 3 seconds to confirm delivery of the final ball.
    e. The robot's final action is to position itself away from the balls at the target to confirm that it has finished the autonomous portion. It may then proceed to the 40-Point Challenge.

<u>40 Point Challenge</u>

1. The goal for this challenge is to collect a total of 40 points by scoring the remaining golf balls and marble into the goal post.
    a. If teams don't collect the full 40 points, they will be awarded the points they did collect. (Example: If 2 golf balls are worth 8 and 12 points each are scored, they earn the team 20 points).
2. **<u>ONLY THE ROBOT</u>** will be allowed to score the golf balls and marble into the goal post.
3. The round concludes when the team reaches 40 points or time runs out, whichever happens first.
4. **Teams that complete the Autonomous Challenge under 1 minute and 45 seconds will get a 30 point bonus.**

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Competition Logistic Rules

1. Teams should assign roles to each teammate. (example: lead engineer, teleoperator, computer scientist, and human player.)
2. The Lead Engineer is responsible for checking in their robot during the Competition.
    a. Robots will be impounded after registration, and no alteration will be allowed.
3. The human player is the only team member allowed to feed balls down the ramp.
4. Each team will have the opportunity to compete in two rounds.
5. **Round #1** is 5 minutes and **Round #2** is 7 minutes
6. **Round #1** is fully in teleoperation mode.
    a. Robots may start anywhere within their playing area.
    b. Robots may NOT block or interfere with the other competing robots. Robots will receive 3 warnings for malicious play
        i. First warning: verbal warning to stop
        ii. Second warning: The robot will receive a 1-minute delay
        iii. Third warning: The robot will be disqualified from the round
        iv. If a team is participating as a volunteer and has malicious intentions, the volunteer team will be replaced with another team.
    c. If something should happen to the robot during teleoperation mode, the team can ask to reset the robot and fix the issue. Time, however, will continue.
7. **Round #2** has two challenges:
    a. Robots will compete in the first challenge in **autonomous** mode.
    b. Teams will start in one of two designated areas in their field area at the beginning of the round.
        i. Teams must stay within their field area. Failure to do so will result in automatic disqualification
    c. Teams must attempt to complete this portion of the competition in autonomous mode or remote control after the allotted time.
        i. Anytime during the autonomous portion, teams may ask for robot resets, but time will continue.
        ii. Teams must attempt the autonomous portion for the FULL 1 minute. Failure to do so will result in an automatic 0 for the entire Round #2. For example, a robot that purposely just spins or stays still for 1 minute will receive 0 points for Round #2.
        iii. If teams are not successful in completing the challenge in autonomous mode, they MUST then complete the challenge in teleoperation mode.
        iv. No points will be awarded for a robot that completes the autonomous task in teleoperation mode.
8. There will be an hour block in between Rounds 1 and 2 for teams to calibrate their robot.
9. During competition, all team members MUST stay in their assigned field area at all times.
10. Teams will begin at **the Judge's signal**. Any robot that fails to do so will be considered a **false start**. A false start will be considered as follows:
    a. A robot is released or its program starts before the Judge's signal.
    b. If a false start happens, then all robots will reset, and the match will restart.
    c. Once the vehicle exits the starting zone, the run is considered legitimate.
11. Teams will be randomly assigned a field and lane, which will be provided on the day of competition.
    a. Teams should assign roles to each teammate. (example: lead engineer, teleoperator, computer scientist, etc.)
    b. Only one teleoperator per round.
    c. The human player will be the designated member to load the golf balls on the device

Day of Competition Rules and Procedure:

1. Teams must be registered **prior** to the competition. MESA Advisors will be responsible for registering each team by **December 11th, 2026.**
2. Team leaders must register/check in their team and robot on the day of the competition.
3. Teams will wait for their round number to be called. When called, teams will wait at the standby pit ready to go into the competition field area.

Application Video Presentation: (*Rubric on page 5*)

The team will be responsible for developing and producing their own video on the educational topic of the competition and their robot. The video must include the following specifications:

1. Videos will be submitted to the link provided: https://forms.gle/k6mwS7LYpTVxPh1z6
    a. The **due date: January 8th at 11:59pm**… No late submissions will be accepted.

Format of the video:

2. The video must be between 3 to 5 minutes long and must be in MP4 video format or a YouTube link. If using YouTube, please set the video to public.

The content of the video:

3. The video must contain the following:
    a. An introductory 5-second segment that displays the team's name, names of members, school, school logo, and IVMESA logo (all together at the same time).
    b. The video **must** explain your team's Engineering Design Process about this competition through an audio recording **and** visual textual display
    c. Theoretical information: Research information on robotics, see page 6 for more information.
    d. Explanation of the code converted in Python, or C++
4. Include a "time-lapse" video demonstration of your robot while completing its tasks on the playing field.
5. Artwork or images that are not original or for public use are prohibited unless permission has been granted by the author/s. If permission is granted, it must be stated directly under the image/artwork.
6. The last 5 seconds of the video must include proper bibliography for information used in the video presentation. Plagiarism will NOT be tolerated, and students will receive a "zero" if information is copied and pasted.

Scoring:

The overall score will consist of the total for the following components:

1. Video Presentation Score
    a. The maximum score possible for the Video Presentation is 25 points.
2. Round #1 Points
    a. Balls scored on the basket: 5 Pts
    b. Balls scored on goal post: 1 Pt
3. Round #2 Points
    a. 120 Total Points possible for both challenges
        i. 80 for the Autonomous Portion
        ii. 40 for the 40 Point challenge

Awards:

Awards will be given for the best score for each of the following categories:

- Video
- Best Robot Design
- Best Engineering Design for Device
- Overall Competition (1st, 2nd, and 3rd Place)

In case of a tie, the robot with the fastest time of completion during round 2 wins.

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Team Name:	School:

Introduction:

- The video must be between 3 to 5 minutes long and must be in MP4 video format or a Youtube link. If using Youtube please set the video to public. (½ point)
- Include the team's name, names of members, school, school logo and IVMESA logo in one slide (1 point)
- The order of the video should follow the video rubric order. For example, the introduction goes first, then the Engineering Design Process and so on. (½ point)

____/2 points

Engineering Design Process:

- Identify the challenge for this competition (1 point)
- Research and brainstorm robot design ideas and human player devices (2 points)
- Highlight at least 2 different robot designs and human player device designs (2 points)
- Observe the different obstacles you encountered when working on your robot and explain the steps you took to solve each obstacle. (2 points)
- Present your final robot design with the human player device, and demonstrate its features and abilities (2 points)

____/9 points

Theoretical information:
(Worth 4pts each)

- Research the different ways robotics is used in sports. Then, give a brief explanation of three examples on how robotics and technology is used in sports.
- In the real world, robotics is everywhere. Research different areas in which robots are used in real life and give a brief description of two areas
- Convert your block code to either C++ or Python. Then, include a portion of your code as a graphic and have every team member explain 2 to 3 lines

___/12 points

Visual Creativity:
(Worth ½ Point each)

- Get creative! Include pictures, animations, video clips of each team member working on the robot and other fun creative ideas!
- Written information should not be obstructed by any video elements
- Every team member must participate equally
- Include a Works Cited Page at the end

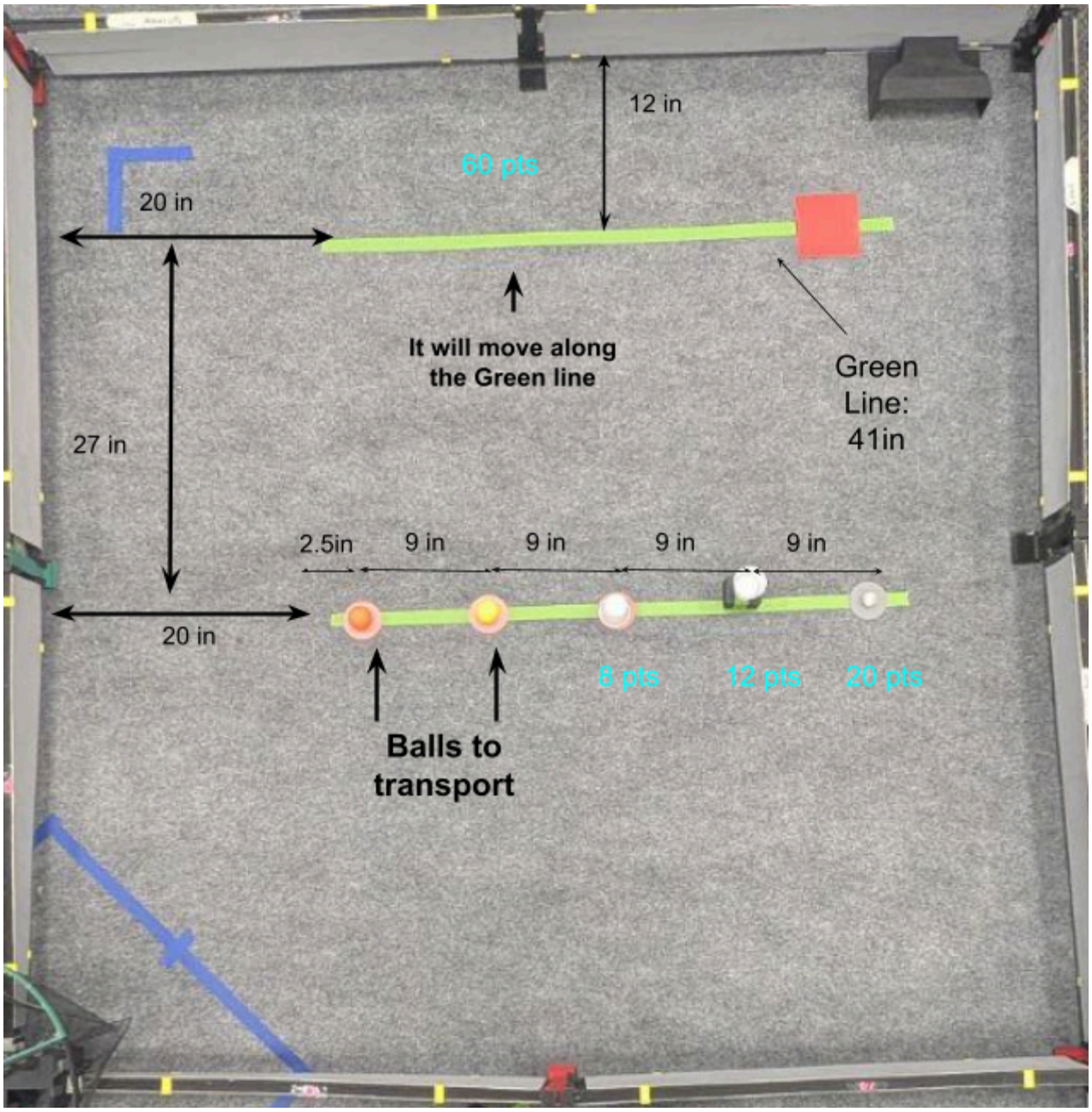
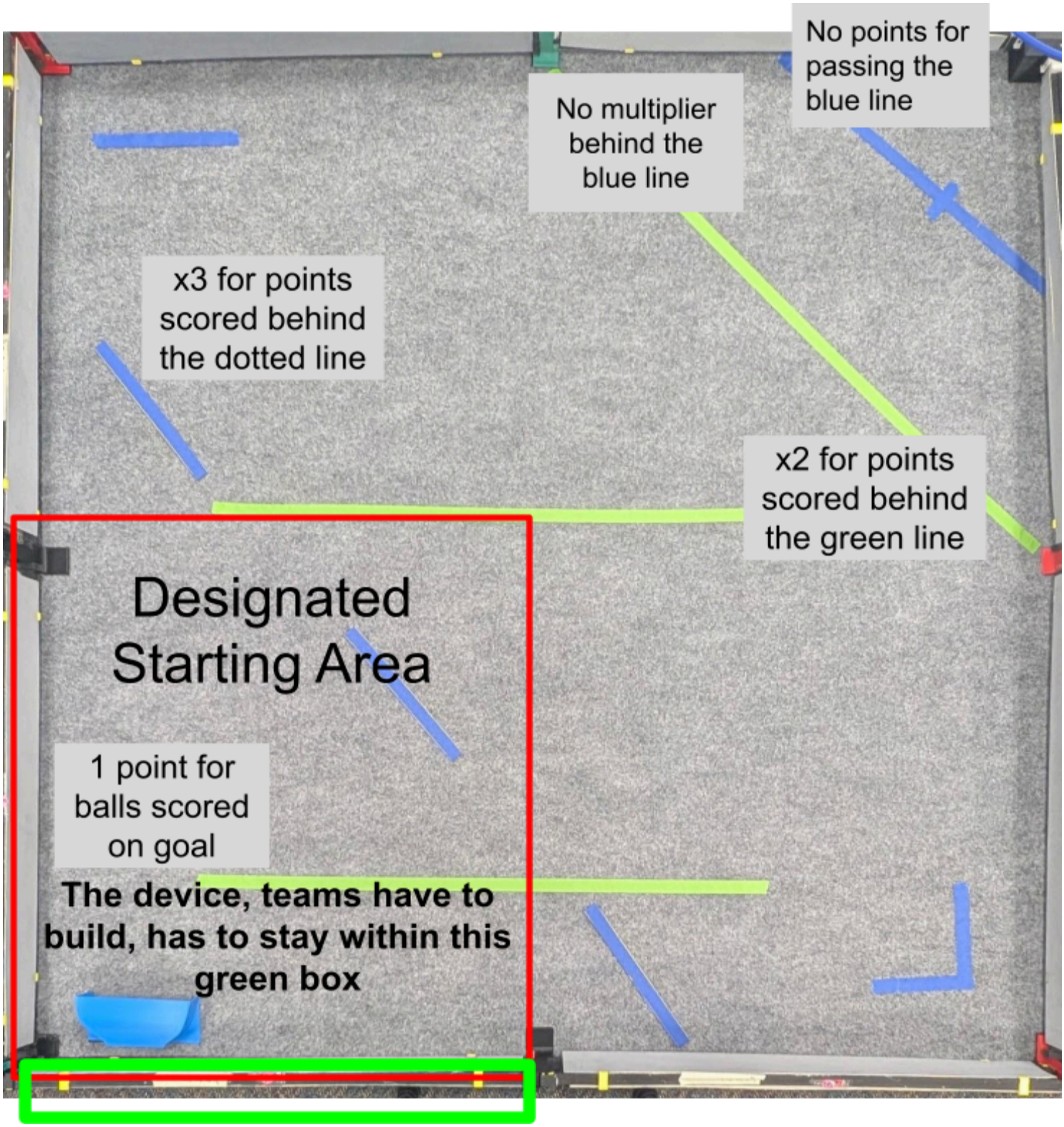
____/2 points

Total: _____/25 points

***The video must not only be a slide deck. Team members must speak for the duration of the video. Videos without team members speaking will automatically receive a zero.**

Field Layout: Autonomous

Scoring



Field Layout Teleoperation: