

# 2026 MS Robotics

## Overview

The mission of your team is to design, build, assemble, and operate a robot that can pick up objects (payloads) of varying types. Navigating through/around various obstacles to gather payloads. Then place payloads into a payload drop off area on a specific target. The course is designed to test the handling, maneuverability, hardware capabilities, and driving skills of your robot.

The event will consist of a check-in and inspection of the team members, robot, and all equipment associated with controlling the robot.

Robotics competitors are to engineer and build an open-source or commercially available robot. Different robots may have different capabilities, but to complete all required tasks, the robot should be able to easily pick up a variety of payloads and deliver them to the designated payload drop off area and place them on various targets.

Competitors are encouraged to research, design, produce, and test their robots to meet the challenges of the year.

## The Mission

- Team/Driver Meeting: Thirty (30) minute maximum for all teams at the assigned time. At the end of the meeting the event will begin.
- Mission Time: Ten (10) minute running clock. Clock will be stopped when all payloads are dropped in the target areas or when the 10 minutes expire.
- There will be 10 possible payloads for the robot to recover and deliver to a target area.
- The course will be approximately 10' x 10', constructed from PVC pipes and fittings.
- Robots may carry only one payload at a time.
- Sets of payloads will each have their own set of obstacles—including overhead obstacles, uneven terrain, and navigation challenges. All payloads must be gathered from their specific course and obstacle areas (IE: robots cannot reach from one obstacle area over to another obstacle area)
- Drivers will control robots via FPV (first-person view) or visual (line of sight) control methods. A secondary driver may also use FPV (goggles, video screen, phone, etc.) or visual methods to complete payload handling tasks.
- Spotters may assist by communicating the robot's location and identifying visible targets.
- Payload Process: All robots will start from the launch area (16"x16"x16 Starting Garage), then choose a payload to acquire, collect the payload, and return to the drop area. Payloads must be placed in the appropriate drop zones to receive credit. Payloads will be organized by the event coordinator or judge. All competitors will have the payloads in the same starting locations.
- No outside devices may be used to hold, stand, or modify the provided payloads.
- The Judging Team will tally up successful drops to specified targets during the 10-minute time.

## Overview / Procedures

- Robots must remain inside the competition area. No exceptions. Violations will result in automatic disqualification. Robots are deemed outside the competition area if they touch the ground outside of the PVC pipe perimeter.
- The event coordinator will assign pit areas for teams to prepare and work on their robots.
- Points will be scored based on payload drop completion and successful obstacle completion for each payload group.
- Robot operation will stop when 1) all payloads are completed or 2) 10 minutes have expired.
- Time will be recorded. In the case of a tie in points, the team with the faster time will be ranked higher.
- Course obstacles location and payload locations will be determined at the conference by the event coordinator. Layout will be viewed at the time of check-in for team planning.
- Targets within the payload drop off location will be determined at the conference by the event coordinator. Layout will be viewed at the time of check-in for team planning.

## Regulations

1. All competitors must follow the safety guidelines and precautions of the event. Violations may result in a warning or disqualification, depending on severity.
2. All robotics competitors are required to wear safety glasses at minimum both in both the pit area and the competition area.
3. Upon entering the competition field, at the discretion of the event coordinator or other authorized personnel, a team may attach the battery and power on their robot.
4. When outside the competition area, all batteries must be unplugged from the robot. At the discretion of the event coordinator or other authorized personnel a team may attach the battery and power on their robot for testing.
5. Robots may only operate within the competition field or designated testing areas as determined by the event coordinator.
6. Robots must maintain physical contact with the competition field surface at all times. They may not become fully airborne, whether intentionally or unintentionally. Brief, incidental loss of contact (e.g., wheels lifting due to terrain) is allowed. Intentional jumping, flying, or hovering is prohibited.
7. Any payload that exits the field ("touches the ground outside the field perimeter) is no longer eligible and is considered "dead ", robots can continue to another payload.
8. Robots must only acquire the payload(s) from within the designated areas for that payload(s). Robots are not permitted to reach or travel over course area dividers to retrieve or return payloads.
9. Obstacles are not to be moved. If the robot intentionally displaces an obstacle by changing its position or orientation to gain an advantage, a 10-point penalty will be assessed. Judges will determine whether any affected payloads are still eligible. Note: For the forest obstacle. If any "trees" are knocked over from the forest base then a penalty of 2.5 points per tree is assessed. If the forest base is moved then a 10-point penalty is assessed.
10. Humans are not to interact with the robot during the match. If a member of the student drive team interacts with the robot a 5-point deduction will be assessed for each interaction. Also, the robot must be moved and reset in the launch area (16"x16"x16 Starting Garage)
11. Payloads are to be transported from the obstacle areas to the payload drop off area and then placed on specific targets. The targets in the payload drop off area are not be removed from the payload drop off area, but may be moved within the area.
12. Violations of any of the above regulations may result in disqualification as determined by judges/event coordinator.

## Course Obstacles/Payloads/Targets:

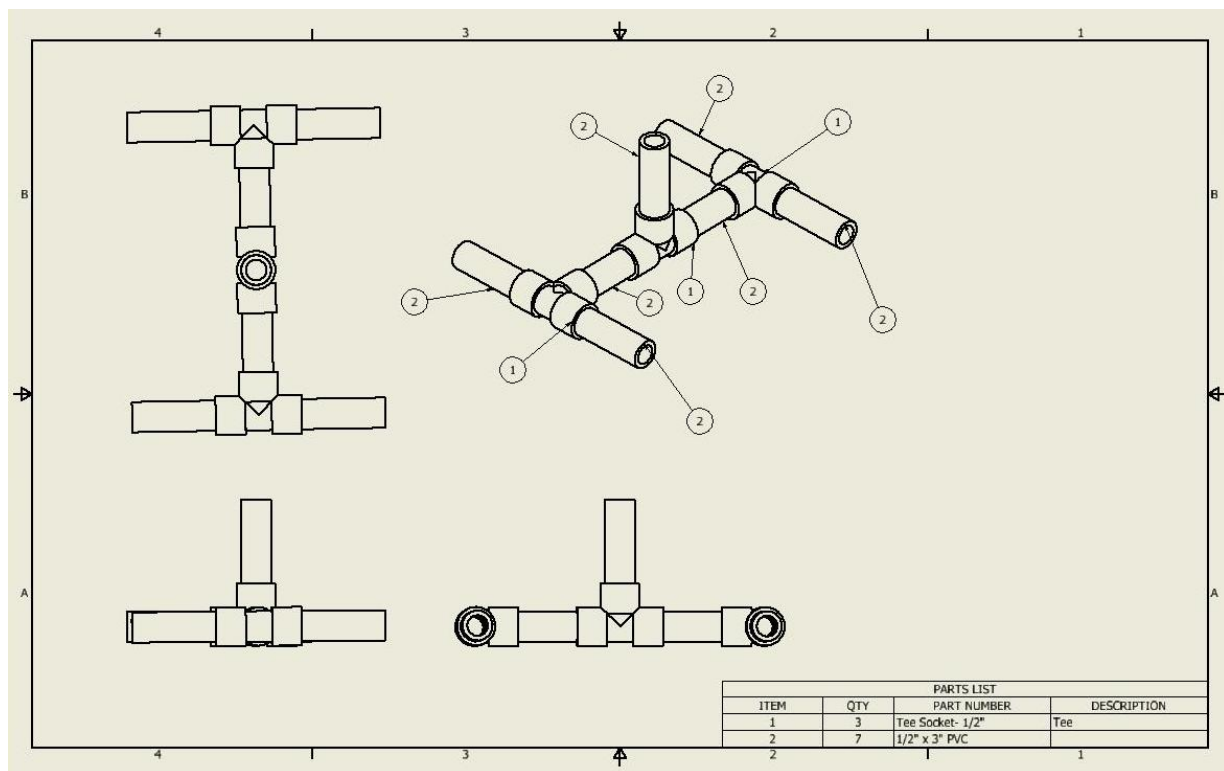
Payloads will be similar to those shown below; 2 of each for a total of 10 payloads.

- Wooden Eggs- [Here](#)
- Rings, Cones, and Bean Bags - [Here](#)
- Spring Toy - [Here](#)

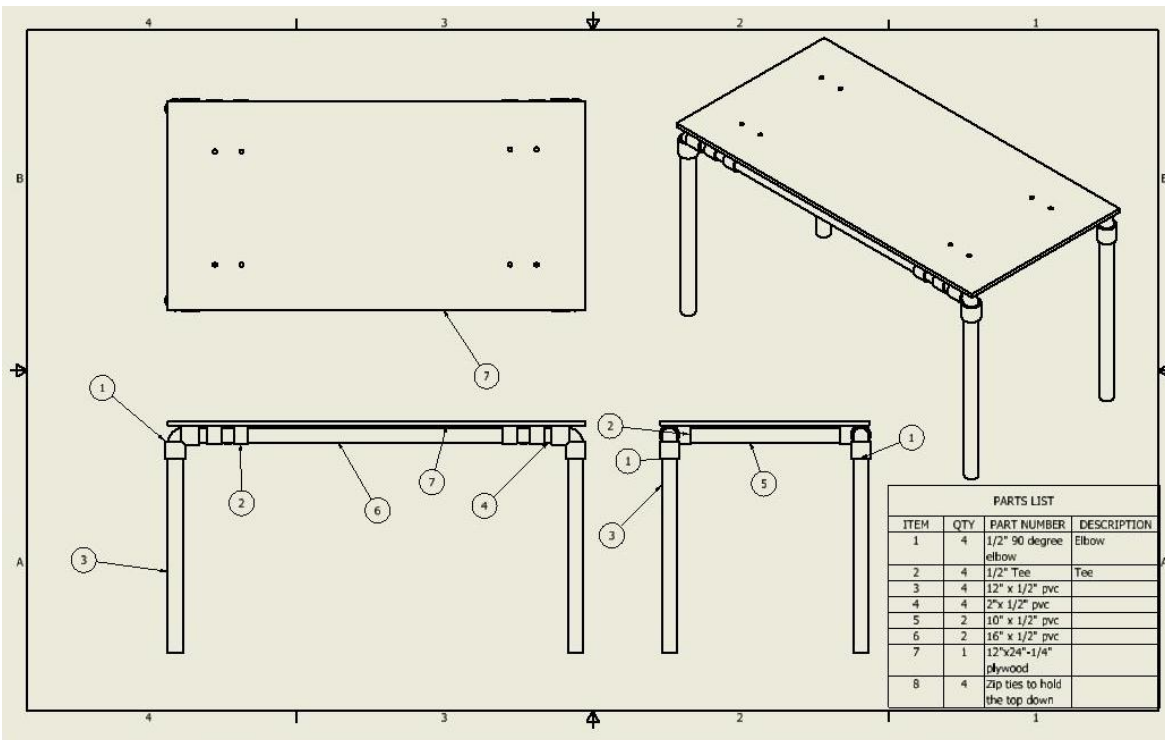
Targets - Ten (10) pts for each successful drop completely in the payload drop off area in the target below.

- Bean Bags will be placed in a [6-quart storage bin shoe box](#). The box will be open with no top/lid.
- Wooden Eggs will be placed in a cardboard dozen egg carton. The egg must be properly placed in a position for a singular egg. The top flap/lid of the egg carton will be removed.
- Rings will be placed on the center vertical pipe of the Ring Post stand shown below.
- Cones will be stacked on top of another cone (1 cones will be placed as a target in the payload drop off area, 2 other cones will be placed as payloads in an obstacle area).
- Spring toy must be placed inside 1 of 2 [3-inch PVC Couplings](#). There will be 2 couplings; spring toys must be placed individually into the couplings.

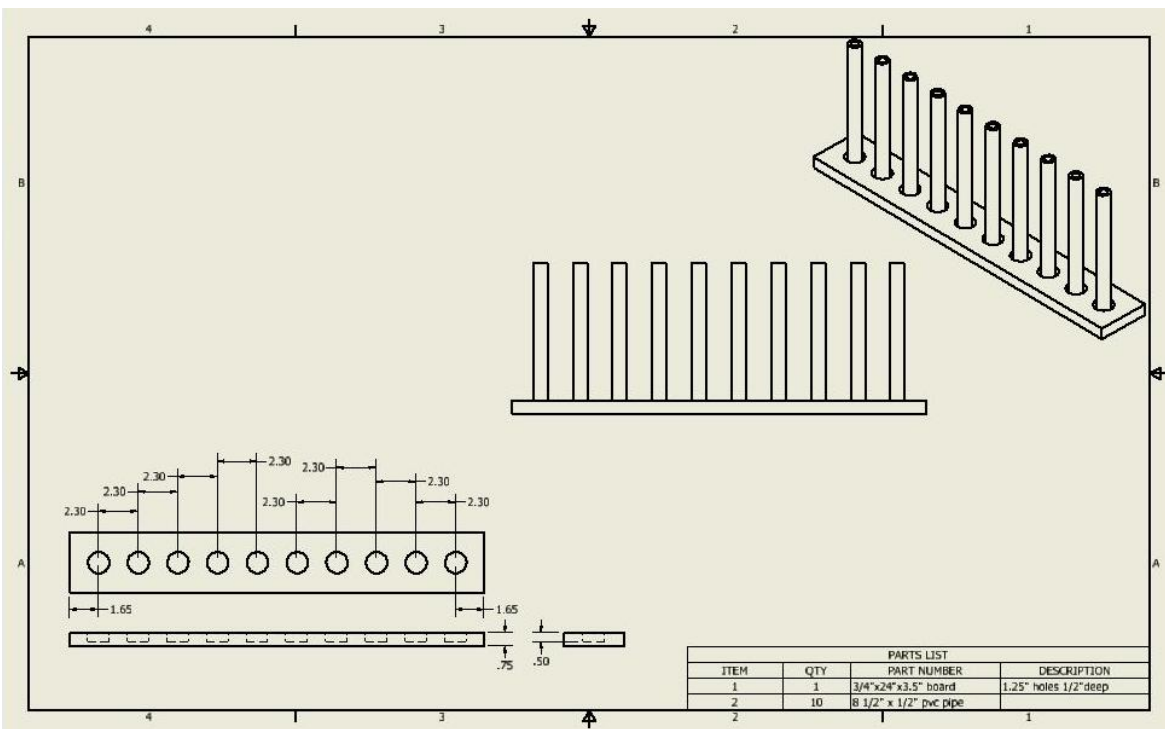
### Ring Post Stand



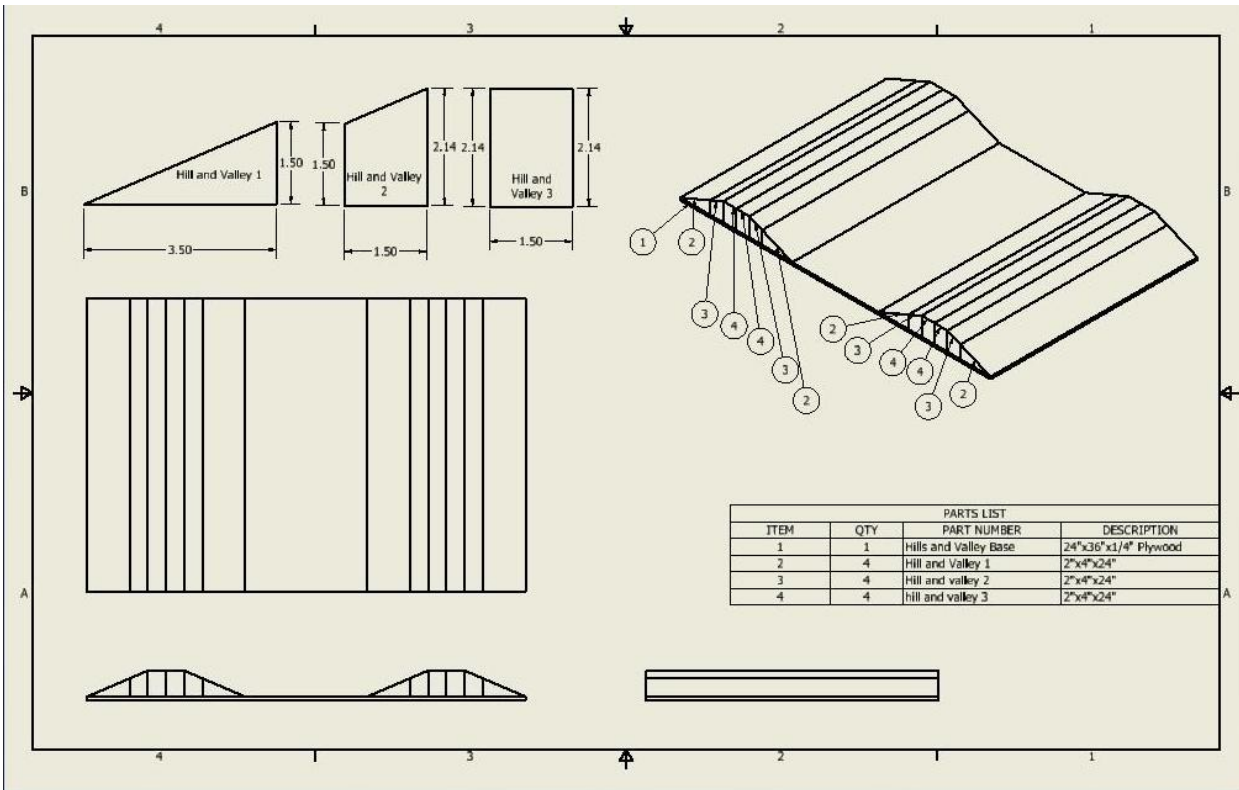
**Obstacle 1 – The Shelf** -made of ½" PVC Pipe and a piece of ¼" plywood



**Obstacle 2– The Forest** – 10 pieces of ½" x 8.5" long PVC pipes standing on end in a wooden holder (2.5pt deduction for each tree knocked over)

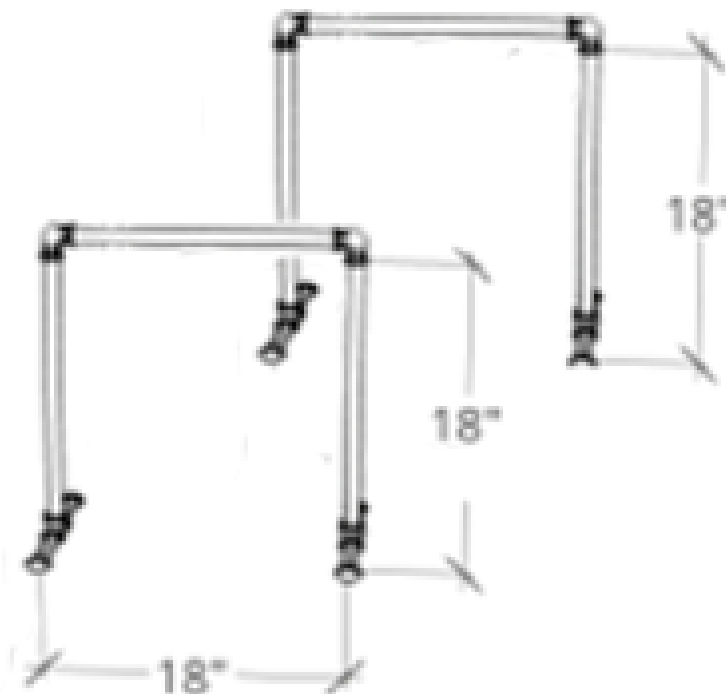


**Obstacle 3** – Hills and Valleys- Made of wood mounted to a piece of  $\frac{1}{4}$ " plywood. Alternatively, the hills may be 3d printed and placed on  $\frac{1}{4}$ " plywood.



**Obstacle 4-** The Meadow- 24"x36" Turf Grass 1"-1.5" tall – similar to [here](#)

**Obstacle 5-** Hurdle- Made of  $\frac{1}{2}$ " PVC, the robot must pass under to get to the payload.



Team Number		Time		
Payload Run		Successful		Run Total Points
1	Wooden Eggs	1 2	X 10pts	
2	Cones	1 2	X 10pts	
3	Rings	1 2	X 10pts	
4	Spring Toy	1 2	X 10pts	
5	Bean Bags	1 2	X 10pts	
Deductions				Total Points /100
Trees knocked over	#		X 2.5 pts	
Times Robot goes out of obstacle boundaries	#		X 10 pts	
Times Obstacles are displaced, or orientation are changed. (other than trees)	#		X 10 pts	
Times Human interacts with robot while it is on course.	#		X 5 pts	
				Total Deduction -
				Final Total Points /100

# Competition Field

General location of starting garage and payload drop off area may be taped to the floor to allow students/judges to see areas.

