

Ripening Quest

Robot ZONE **[01]**

Creative Challenge

2027

Context

In the village of Merodian, a giant fruit, a lumis, has the ability to thrive.

However, the fruit is constantly being eaten by moose before they ripen, while they are still green.

To help protect these precious fruits, you must construct a robot that moves unripe lumis to tall tree branches so they can ripen undisturbed by moose.

The lumis that have ripened fully, and become yellow or red, may be collected from the tree and taken to the delivery zone to be stored safely.

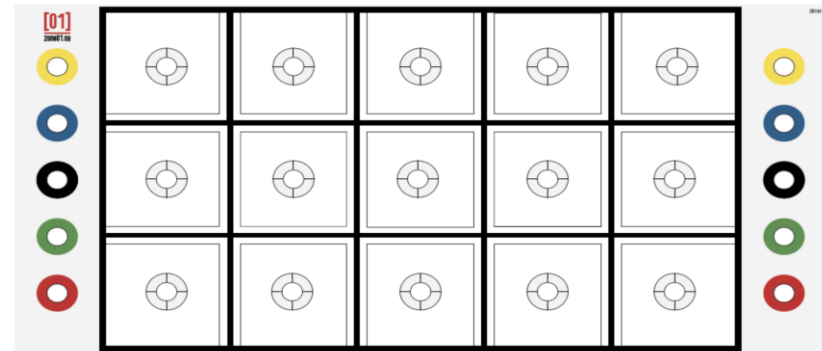
Robot Description

All robots must comply with the following constraints:

1. Robots must begin completely within the starting area (35cm x 35cm)
2. There is no height limit. Once the timer starts, there are no size constraints.
3. The challenge takes place in autonomous mode. The program must be uploaded to the robot BEFORE the round begins.

Game Surface

Surface used : Z01-H Mat



The mat is highly recommended for this challenge, as the lines drawn on it help you robot navigate on the playing field. The mat is available at the [Zone01 shop](#).

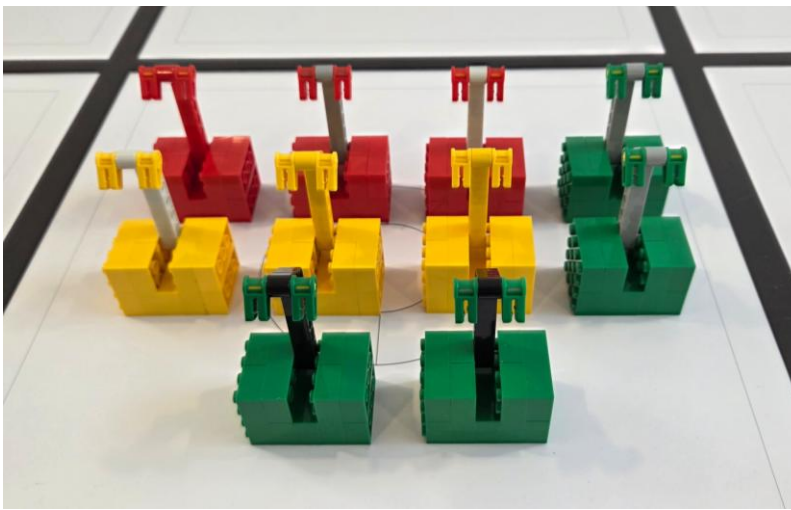
Description of Elements

Lumis

The lumis are giant and delicious fruits found around the village of Merodian.

The green lumis are unripe and much less delicious. They turn yellow and red when they get ripe.

There are 10 lumis; 3 red, 3 yellow, and 4 green. Two of the green lumis have black stems.

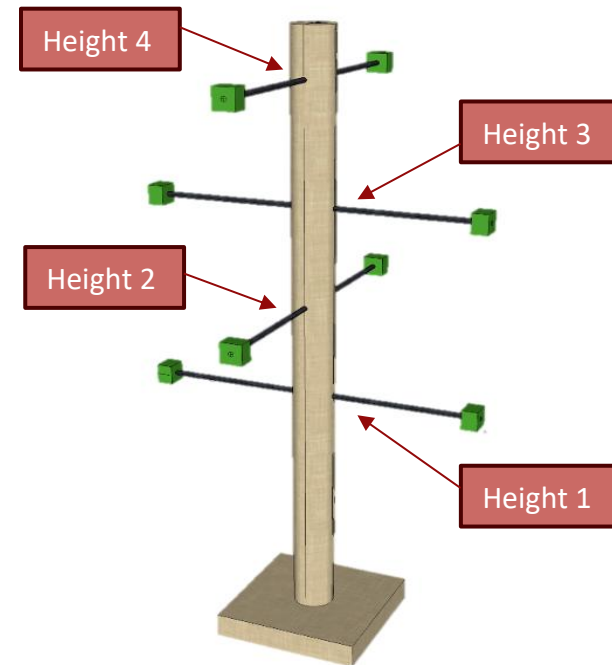


Trees and Branches

Trees are made of wood. Branches are made from long LEGO axles no 50450 from the Spike Prime expansion kit.

The leaves are made of 2x2 LEGO bricks.

There are 2 trees on the playing field.



Tree Trunk Dimensions

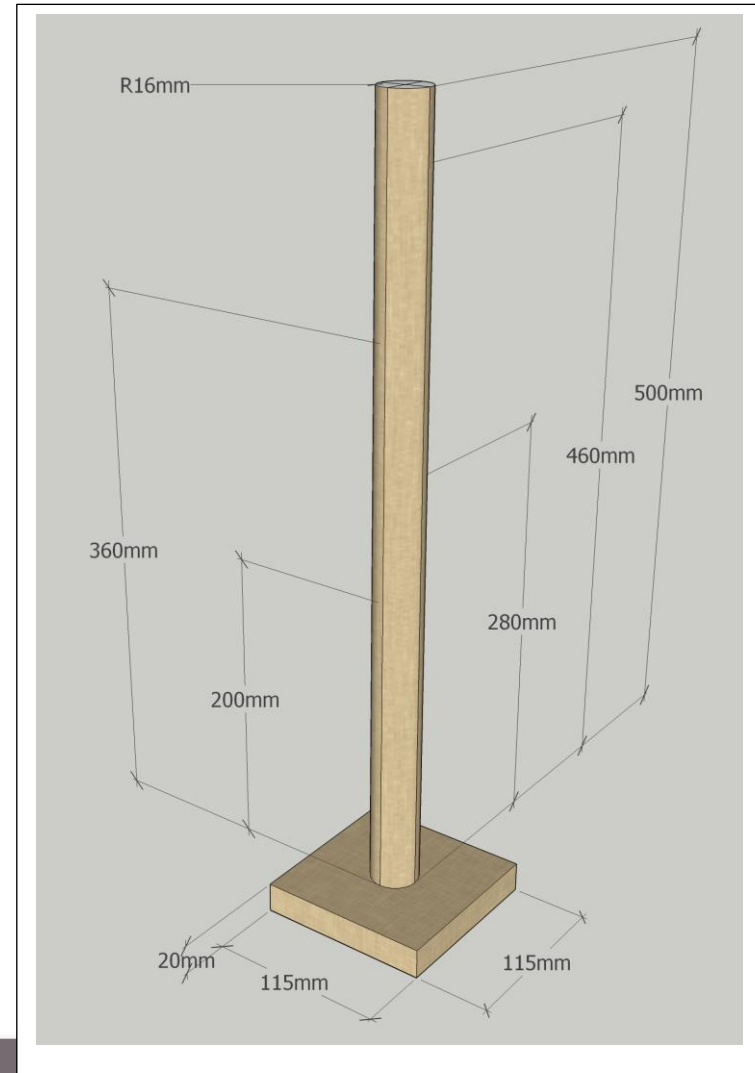
The tree base is a square wooden board approximately 20 mm (3/4 inch) thick.

The trunk is a wooden rod 32 mm in diameter and 500 mm tall - can be found at home improvement stores.

Holes are drilled into the rod at various heights to attach the branches.

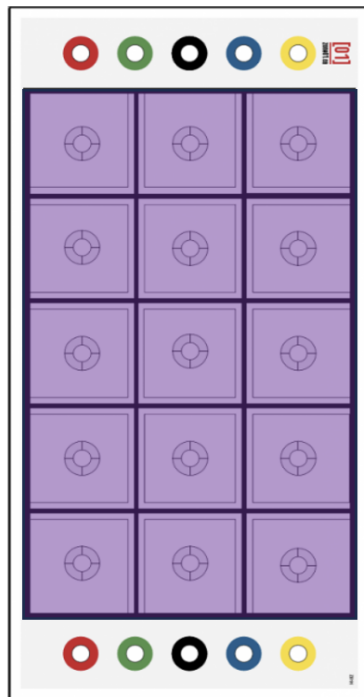
Using a drill press is recommended to ensure proper branch alignment. The holes are 4.76 mm (3/16 inch) in diameter.

Key dimensions are shown in the adjacent image +/- 5mm.



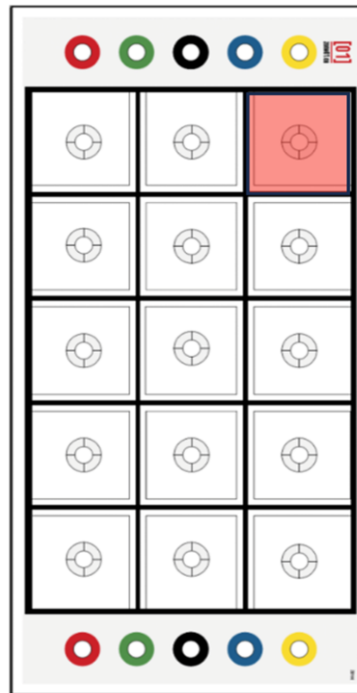
Orchard

The orchard is the section of the mat made up of three rows of five white squares surrounded by black lines (shown in purple).



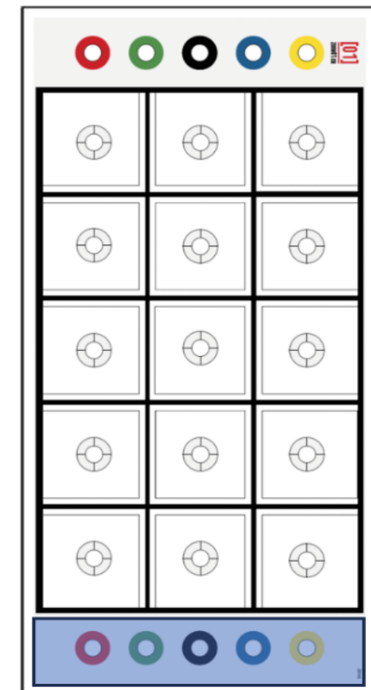
Starting Zone

The starting zone (shown in red) corresponds to the square located near the Zone01 logo, excluding the large black line.



Delivery Zone

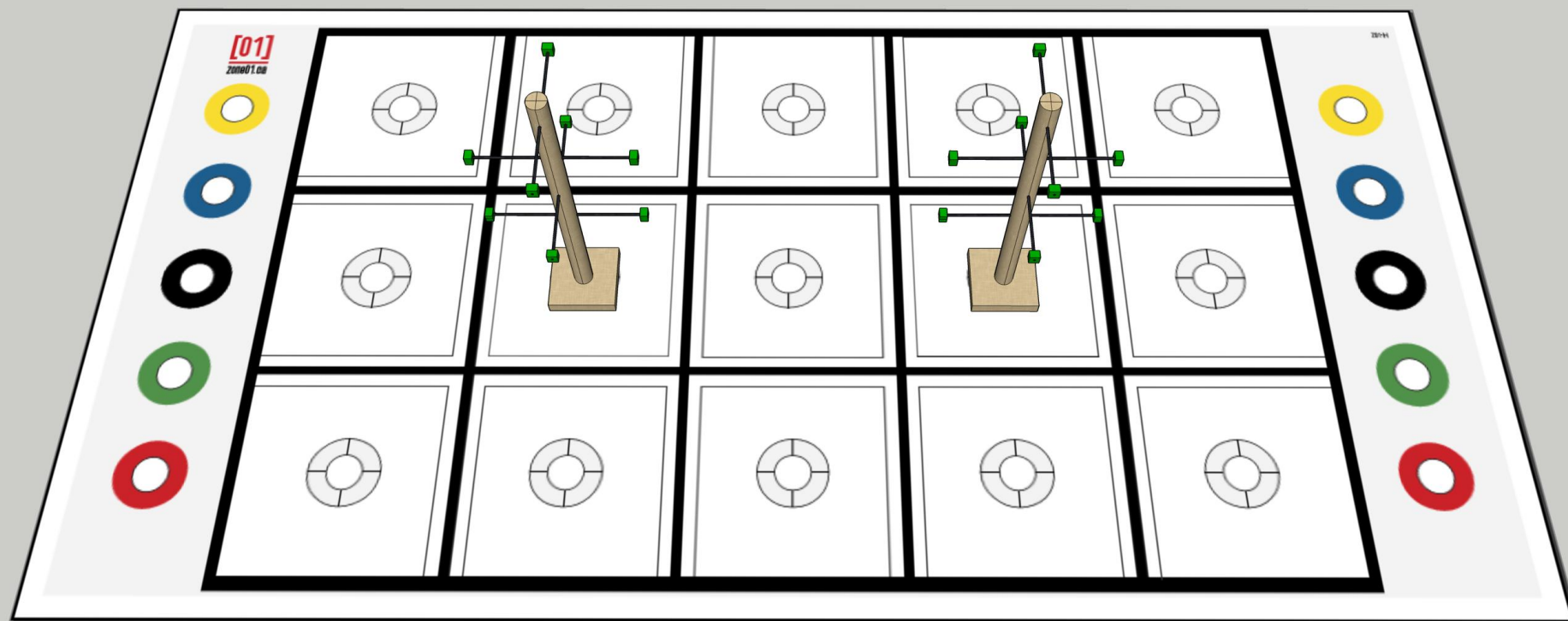
The delivery zone (shown in blue) is the space at the end of the orchard where the colored circles are located, excluding the black line.



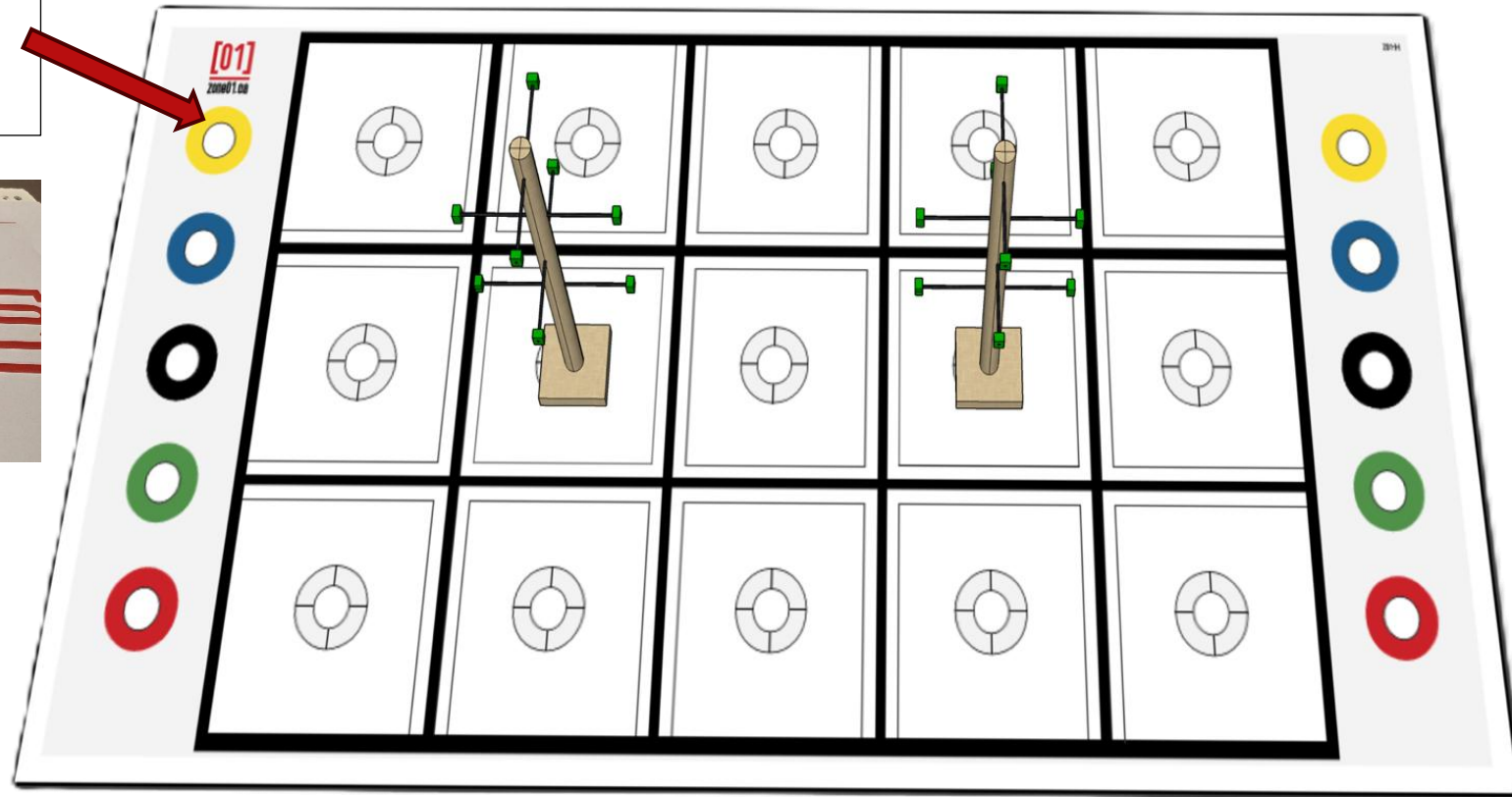
Position of the trees

Trees will be attached to the mat, within the orchard, using double-sided tape.

The orientation of the trees is always the same, with the long upper branch perpendicular to the length of the mat.



Starting location of
the 2 green, unripe
lumis with black
stem



Lumis Orientation

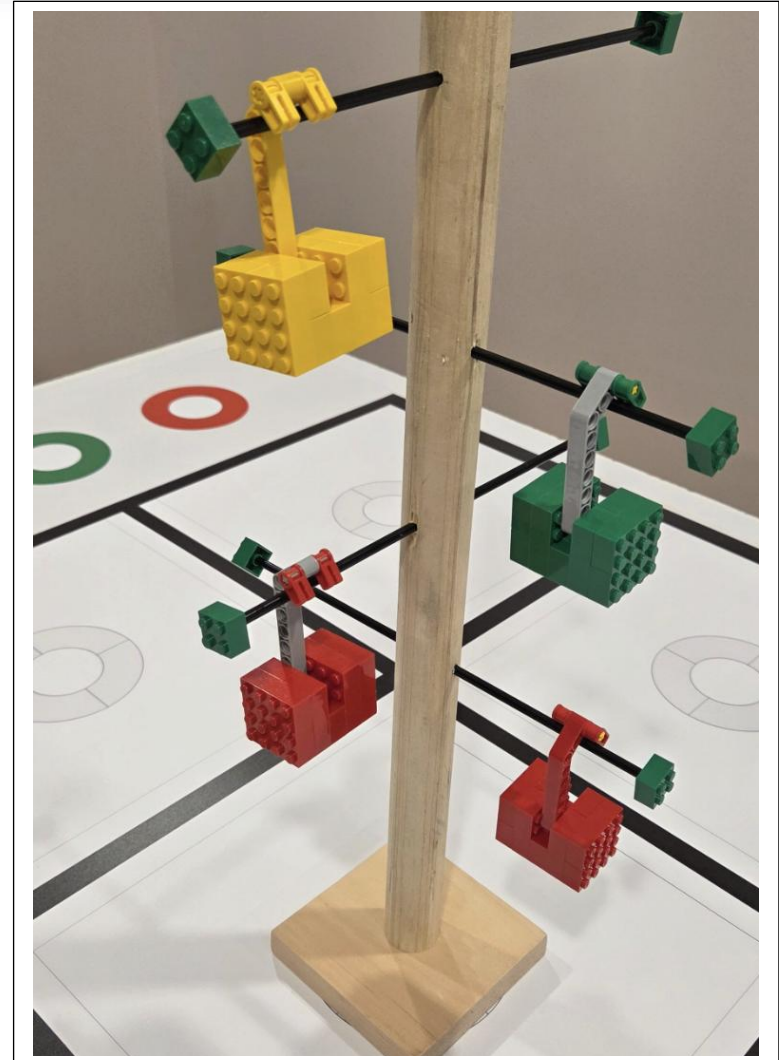
Yellow, red and green lumis are hung from the tree in a counterclockwise manner.

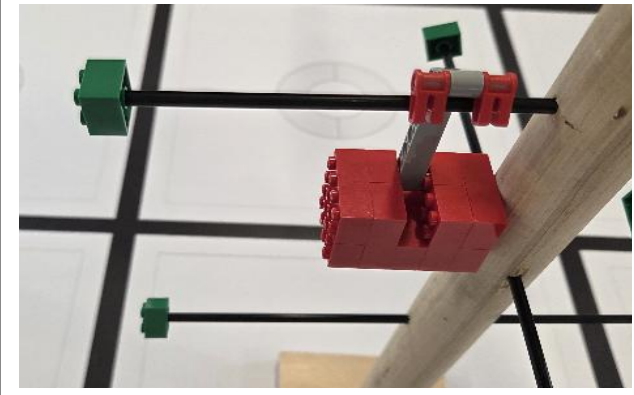
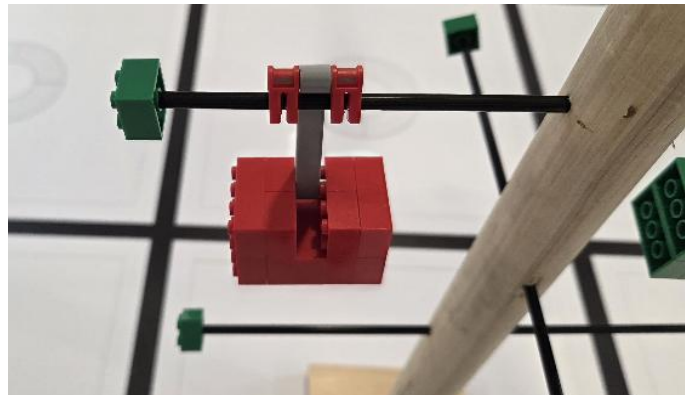
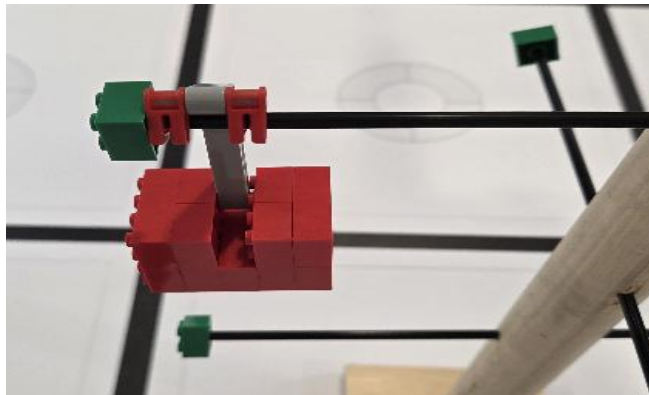
One tree will hold 2 red, 1 yellow, and 1 green lumis.

The other tree will hold 2 yellow, 1 red, and 1 green lumis.

There will always be one lumis on the top branch.

***The position of the specific lumis will be decided on the morning of the competition and will remain the same for the day.**





Lumis can be placed/hung anywhere along the length of the branch.

Their position along the length of the branch can be chosen by the team before the round begins. All the lumis need to be positioned the same way.

Missions



Start

Team places robot completely within the starting zone and selects the program that will be used.

Teams can adjust the position of the lumis along the branches if desired.

Judges will randomize the game elements, if necessary.

Teams are not permitted to modify the robot or program once the judge has completed randomization.

When the judge gives the signal to start, teams will activate their robot.

Teams can **complete the missions in any order they choose**, without moving the trees from their initial position.

The round ends when the team says “STOP”, if the robot is touched, or if the 2-minute timer ends.

Mission 1: Lift lumis to safety

Hang one unripe (green) lumis with black stem from each tree using the available branches.

Team is allowed to manually load the lumis on the robot after the start when it is touching the starting area.

Lumis can be loaded one at a time. The second lumis may be loaded when the robot returns to the starting area after hanging the first lumis.

You are not allowed to touch the robot at anytime.

Points will vary based on the branch height chosen to hang lumis from (more points for higher).

Mission 2: Harvest the ripe lumis

Collect ONLY the red and yellow lumis from their branches. Do this without knocking the tree out of its position and without removing any other pieces from the tree. This must be done without the lumis touching the ground. Any lumis touching the ground in the orchard area will be discarded by the judge.

Mission 3: Carry the lumis to the delivery zone

Bring the harvested lumis to the delivery zone. Once the robot touches the delivery zone, lumis can be manually offloaded.

Mission 4: Park your robot in the delivery zone

Park your robot completely within the delivery zone at the end of the round.

Bonus Points

Teams will have opportunities to collect bonus points, but they may require additional programming or mechanical components!

Bonus Point Opportunity:

For bonus points, teams can place both green lumis with black stem on the robot at the very beginning of the round (after pressing start button) and leave them untouched (other than by the robot) for the remainder of the challenge. Placing both on the robot from the beginning will add 10 points to your score.

Expert Mode

National Final only, 13-19 years-old

Expert Mode is for the craziest teams! In the Expert Mode, the orientation of the trees will be randomized and the lumis position on each tree too! Your robot will have to find the ripe fruits on its own!

Counterclockwise hanging direction will remain.

Choosing Expert Mode is worth an additional 10 points and may qualify your team for a special award!

Missions	Points Each		Max Points
Hang unripe green lumis with black stem from open branches *Point value varies based on the branch height	Height 4	16	32
	Height 3	11	22
	Height 2	9	18
	Height 1	8	16
Remove the ripe lumis from the tree (red and yellow fruits)	5		30
Bring ripe lumis to the delivery zone	4		24
Leave the unripe lumis untouched when on the tree	4		8
Park robot completely within the delivery zone	6		6

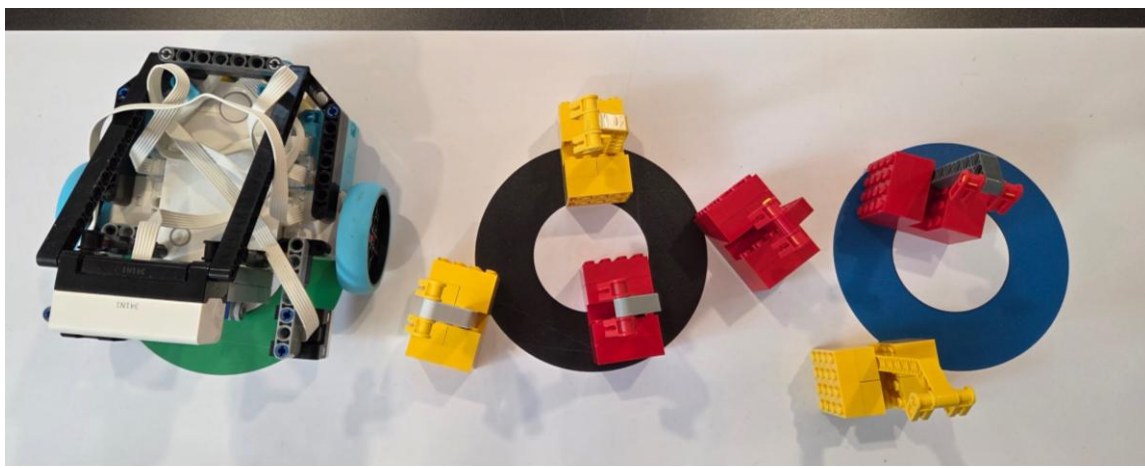
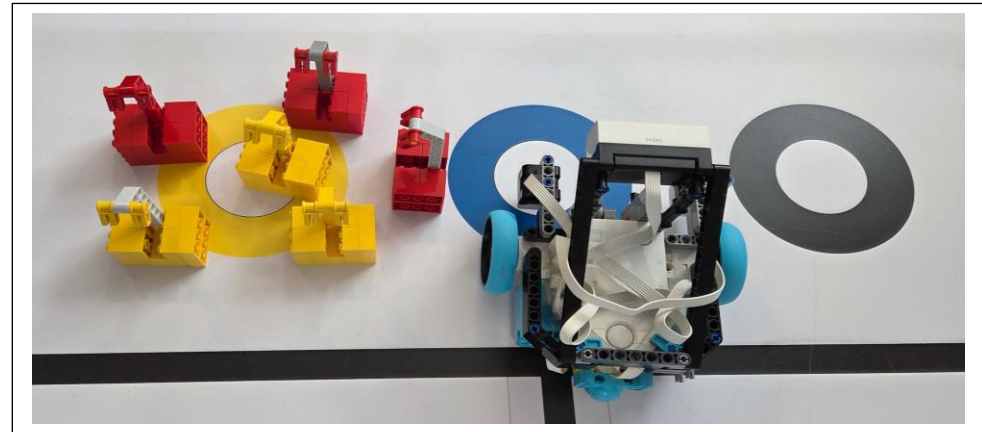
SCORING

Bonus Options	Points
Both lumis with black stem placed on robot at beginning	10
Expert Mode: Lumis position and tree orientation randomized (National Final only, 13-19 years old)	10
Solve the surprise rule	20
TOTAL MAX POINTS	140

Penalties	Points Deducted Each
Tree moved from its position	-15
Leaves removed from tree	-2

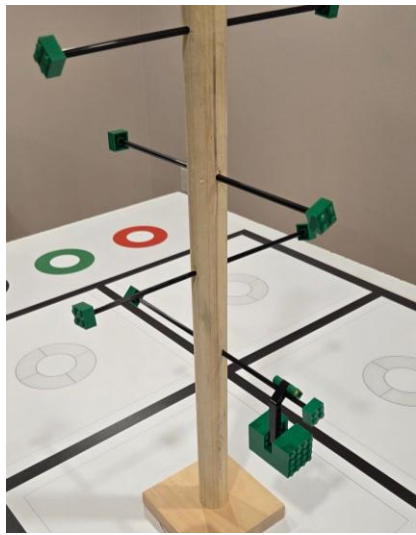
Points Interpretation

Robot and all the ripe lumis placed completely within the delivery/end zone
→ **6 points for robot, 5+4 points per lumis:**
total 60 points



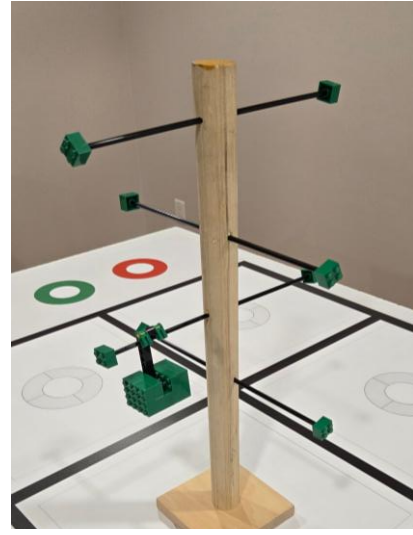
All ripe lumis placed partially in the delivery zone
→ **0 points for robot, 5+4 points per lumis:**
total 54 points

Height 1



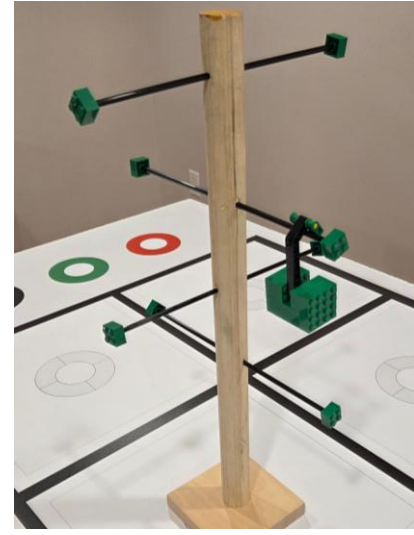
8 POINTS

Height 2



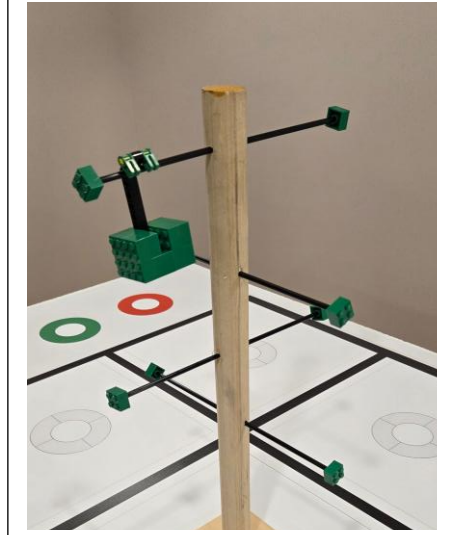
9 POINTS

Height 3

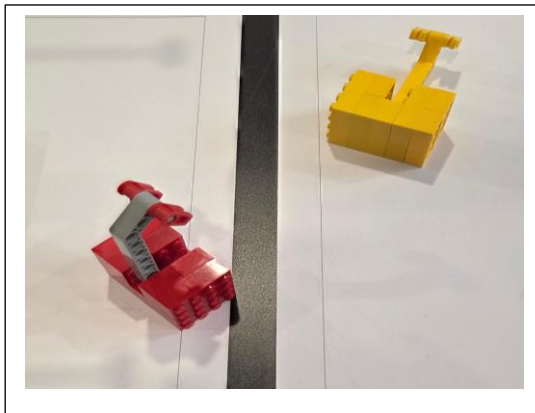


11 POINTS

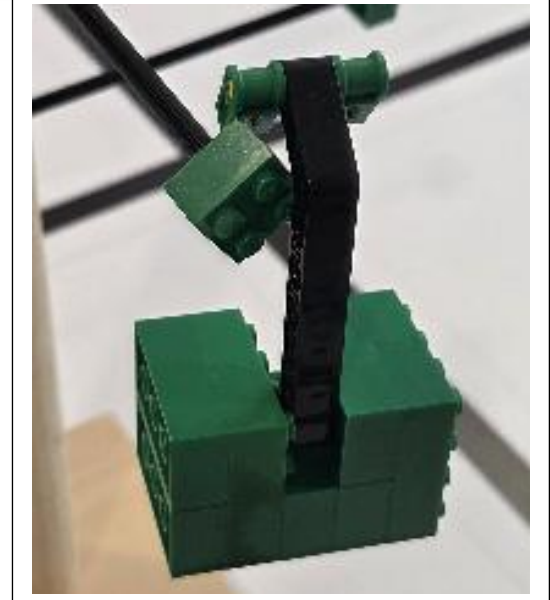
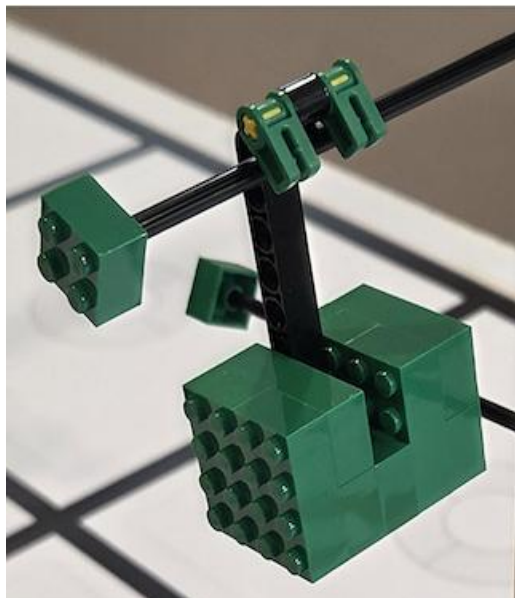
Height 4



16 POINTS

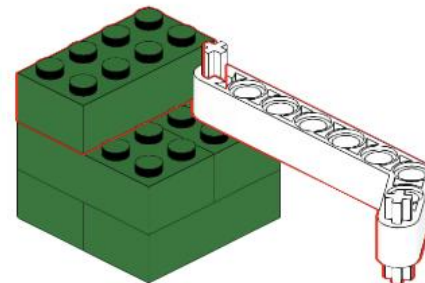
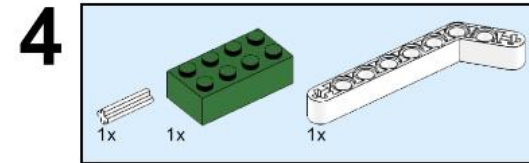
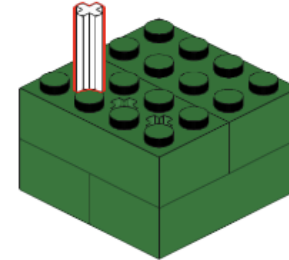
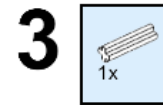
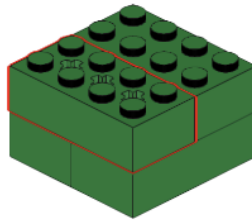
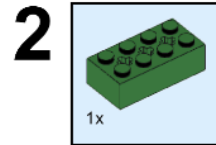
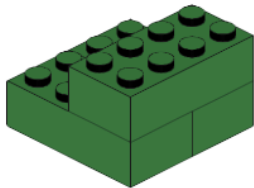
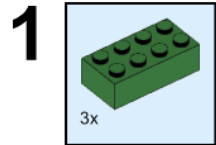


Lumis that fall onto the floor of the orchard before reaching the delivery zone are considered **INVALID** and will be carefully removed by the judge.

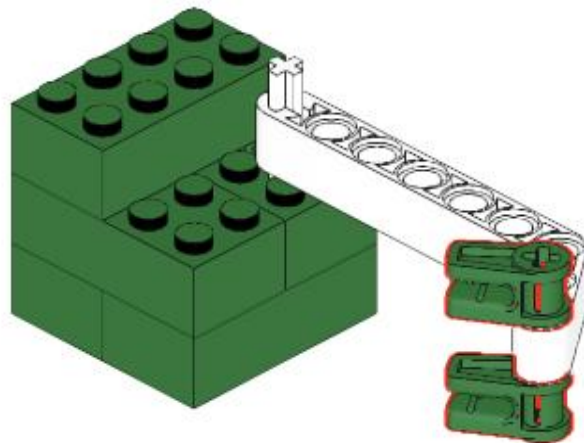
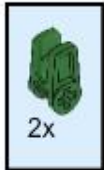


The two green, unripe lumis with black stem can be hung from the branches in any way, as long as they do not fall off. All of the examples above would count.

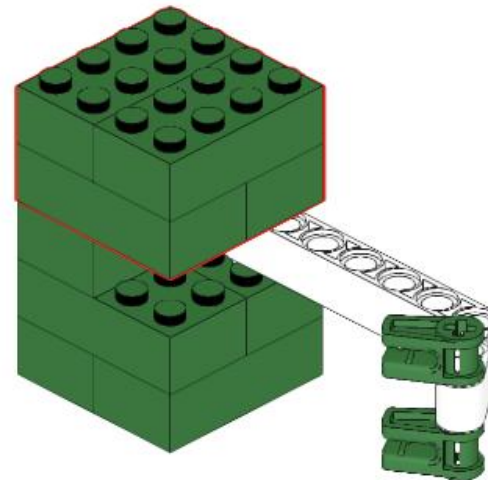
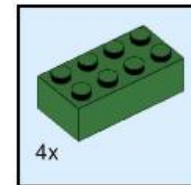
Building Instructions



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6



Repeat for all 10 lumis → 3 red, 3 yellow, and 4 green

Remember: Two of the green lumis have a black stem, and the remaining 8 lumis will never have a black stem.