



## Regular Category

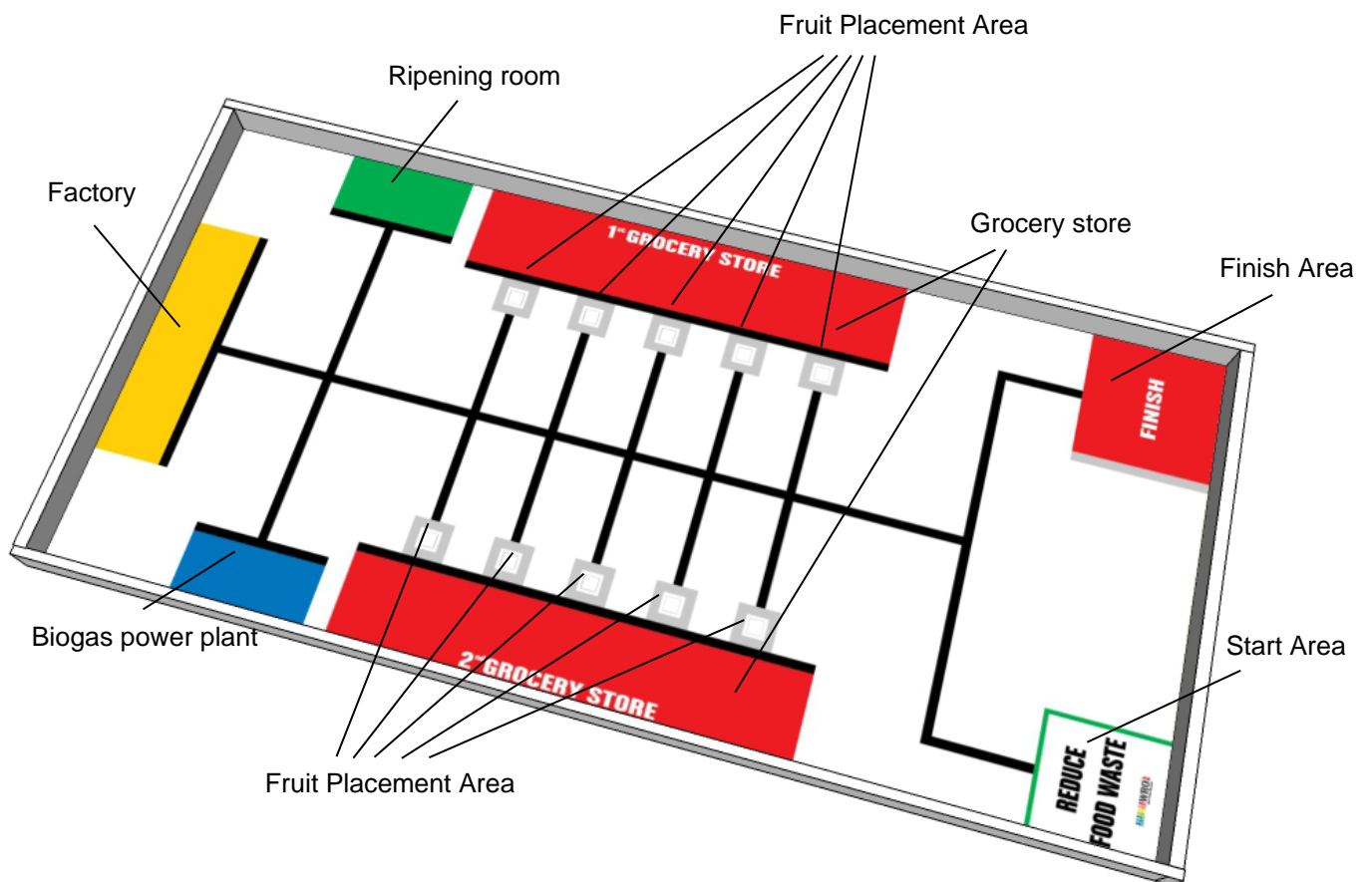
# Elementary School

Game Description, Rules, and Scoring

## Reduce Food Waste

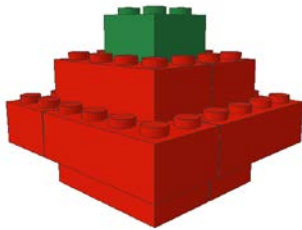
# 1. Introduction

This year, the mission is to make a robot that can help reduce food waste. The task of the robot is to sort food products according to their looks and expiration dates and transport the sorted food to places that can make use of the food instead wasting it; i.e. dumping the non-sellable food to a landfill.

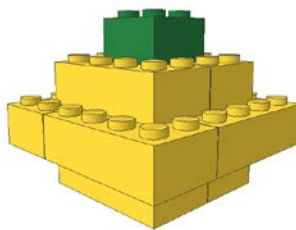


## 2. Game Description

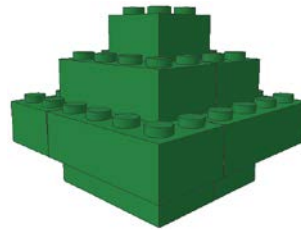
The Elementary Challenge is to make a robot that can sort the fruit products from a farm according to their quality, or appearance. There are four kinds of qualities: fresh fruit, unripe fruit, imperfect or “ugly” fruit, and rotten fruit.



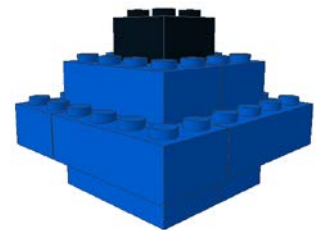
Fresh Fruit (4)



Ugly Fruit (2)



Unripe Fruit (2)



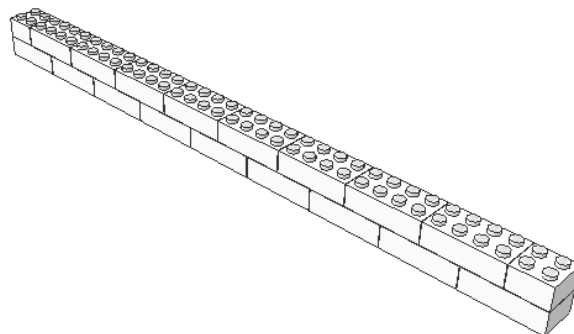
Rotten Fruit (2)

Ten LEGO fruit blocks are placed on the ten grey squares of the Fruit Placement Area.

After sorting the fruit, the robot must transport the fruit from the farm to locations that match the quality of the fruit: fresh fruit to the grocery store, unripe fruit to a ripening room, ugly fruit to a factory to be processed into juice, fruit salad or smoothies, and rotten fruit to a biogas power plant.

In the game arena, the two red areas are the grocery stores, the blue area is the biogas power plant, the green area is the ripening room, and the yellow area is the ugly-food processing factory.

The robot must start from within the Start Area, inside the green line and should finish in the red area with the White Wall:



White Wall

### 3. Game Rules

1. Before each round, 4 red fruit, 2 yellow fruit, 2 green fruit, and 2 blue fruit are randomly placed on the 10 grey squares of the Fruit Placement Area as shown in the figure 2.1. The random placement for the 10 fruits will be constant in a round.

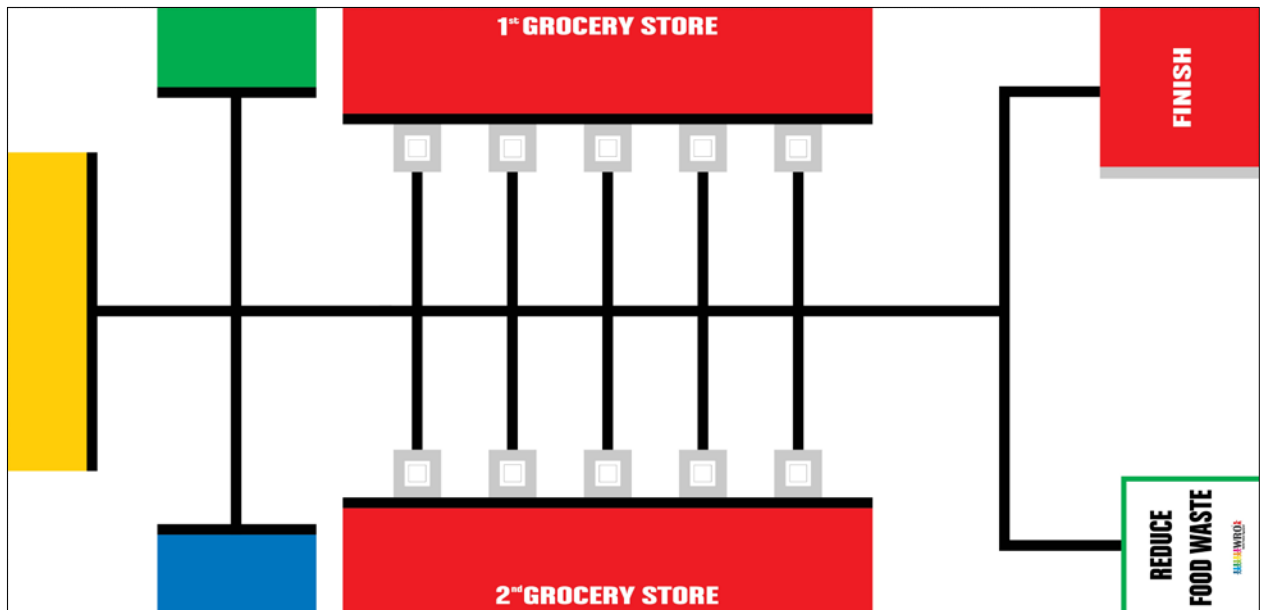
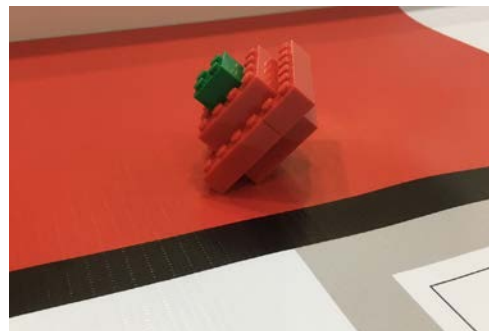
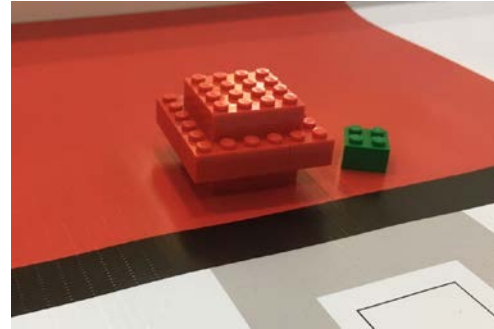
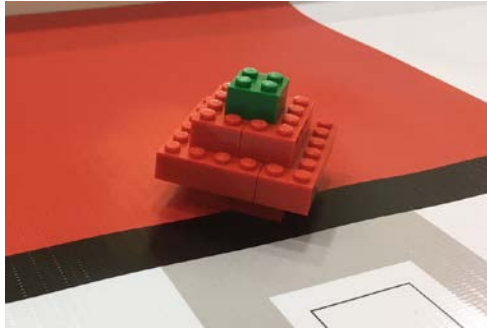
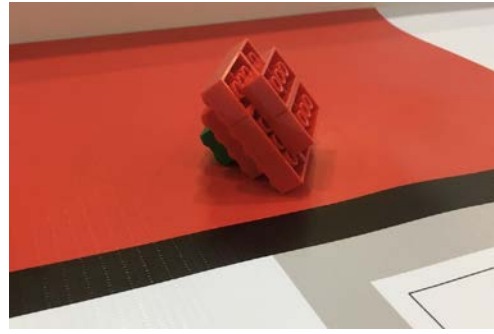
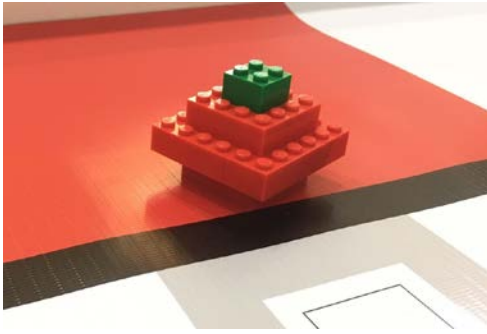


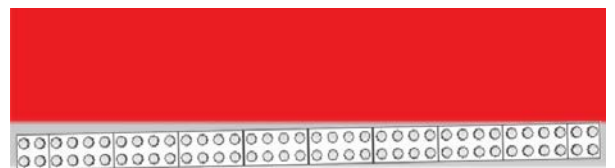
Figure 2.1

2. The 10 fruit blocks must be moved by the robot from the Fruit Placement Area to the destination areas for the four different kinds of fruits: The Red Fruit to one of the two red areas (Grocery Stores), Yellow Fruit to yellow area, Green Fruit to green area, and Blue Fruit to blue area. A fruit block is correctly placed in an area if it is undamaged and is completely within the area that matches its color. A fruit block is considered completely within an area if the base of a block is touching the area.





3. The white wall next to the Finish Area must not be damaged or moved from its initial location area. If the White Wall is damaged or moved, a penalty is given, provided it does not result in a negative score (see General Rules 5.15).



5. Before the start of the mission, the robot must start completely within Start Area (the green line around the area not included). The mission is completed and finish point is awarded when the robot stopped at the Finish Area and one of the team member said stop. All parts of the robot which is touching the mat must be completely inside the Finish Area (cables are allowed to be outside of the finish area).
  
6. Your attempt and time will end if:
  - a. Challenge time (2 minutes) has ended.
  - b. Any team member touches the robot or any game object on the field during the run.
  - c. The robot has completely left the game table.
  - d. A team member shouts "STOP" to end the run.
  - e. Violation of the rules and regulations within.(Finish point are not awarded on the conditions above)

(1) Definition of damaged for this document: A game object is damaged if at least one brick is completely detached from the position it was attached in the initial buildup.

## 4. Scoring

1. Score will be calculated when the challenge is completed or when time elapses.
2. Maximum score = 170 points.
3. If teams have the same score, ranking is decided by the shortest time recorded.

<b>Tasks</b>	<b>Points Each</b>	<b>Total</b>
Fresh fruit (Red Fruit) completely within a red area (Grocery Store).	<b>10</b>	<b>40</b>
Fresh fruit (Red Fruit) partly within a red area (Grocery Store).	5	20
Unripe fruit (Green Fruit) completely within the green area.	<b>20</b>	<b>40</b>
Unripe fruit (Green Fruit) partly within the green area.	5	10
Ugly fruit (Yellow Fruit) completely within the yellow area.	<b>20</b>	<b>40</b>
Ugly fruit (Yellow Fruit) partly within the yellow area.	5	10
Rotten fruit (Blue Fruit) completely within the blue area.	<b>20</b>	<b>40</b>
Rotten fruit (Blue Fruit) partly within the blue area.	5	10
Robot damages or displaces the wall from its initial position		-10
Robot completely stops within Finish Area. (only gets these points if other points are assigned)		<b>10</b>
<b>Maximum Score</b>		<b>170</b>

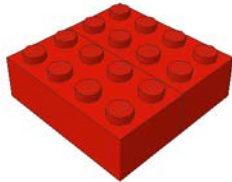




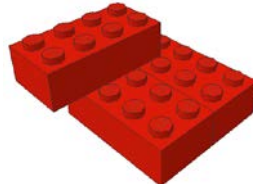
## 6. Game Object Specifications

Each Fresh Fruit has 8 red 2x4 LEGO bricks, 1 red 2x2 LEGO brick and 1 green 2x2 LEGO brick.

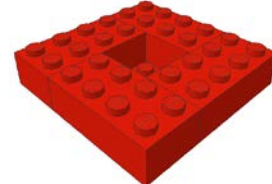
**4 Fresh Fruit are needed.**



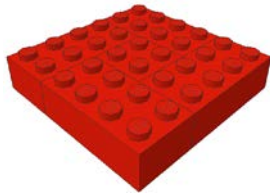
Step 1



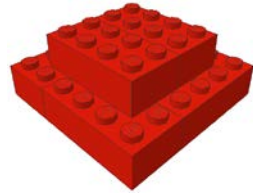
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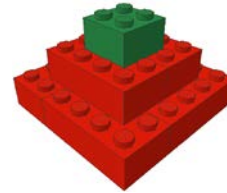
Step 3



Step 4

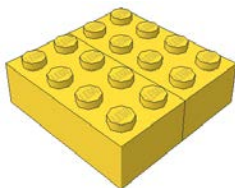


Step 5

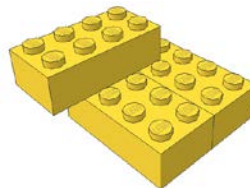


Step 6

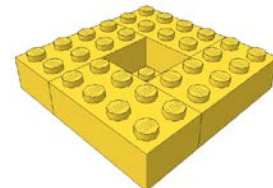
Each Ugly Fruit has 8 yellow 2x4 LEGO bricks, 1 yellow 2x2 LEGO brick and 1 green 2x2 LEGO brick. **2 Ugly Fruit are needed.**



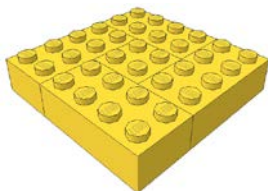
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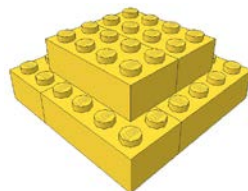
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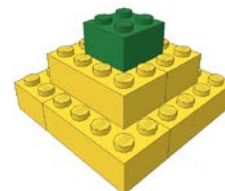
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Step 4



Step 5

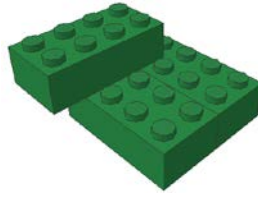


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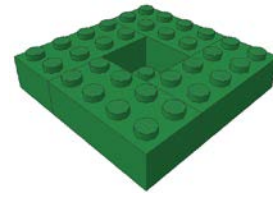
Each Unripe Fruit has 8 green 2x4 LEGO bricks, 1 black 2x2 LEGO brick and 1 green 2x2 LEGO brick. **2 Unripe Fruit are needed.**



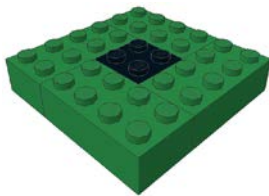
Step 1



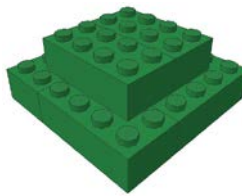
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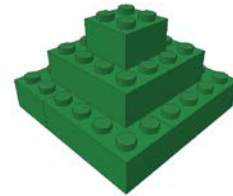
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Step 4



Step 5

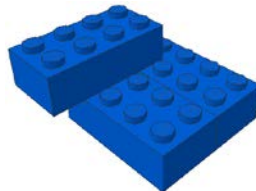


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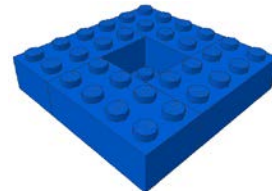
Each Rotten Fruit has 8 blue 2x4 LEGO bricks, 1 blue 2x2 LEGO brick and 1 black 2x2 LEGO brick. **2 Rotten Fruit are needed.**



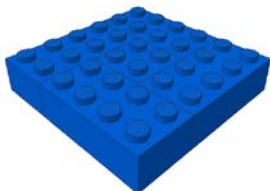
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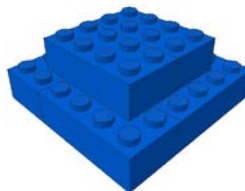
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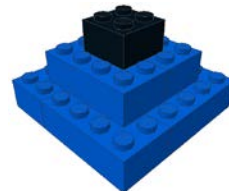
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Step 4

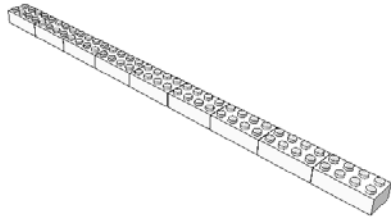


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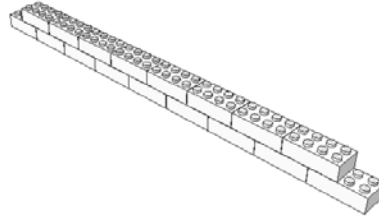


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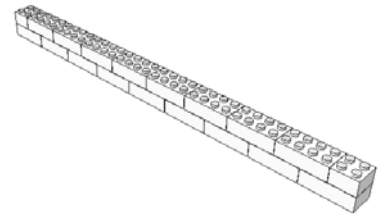
The White Wall has 17 white 2x4 LEGO bricks and 2 white 2x2 LEGO bricks.



**Step 1**



**Step 2**



**Step 3**