

# **WRO2013**

# **RegularCategory**

## **Elementary School**

Game description, rules, & scoring

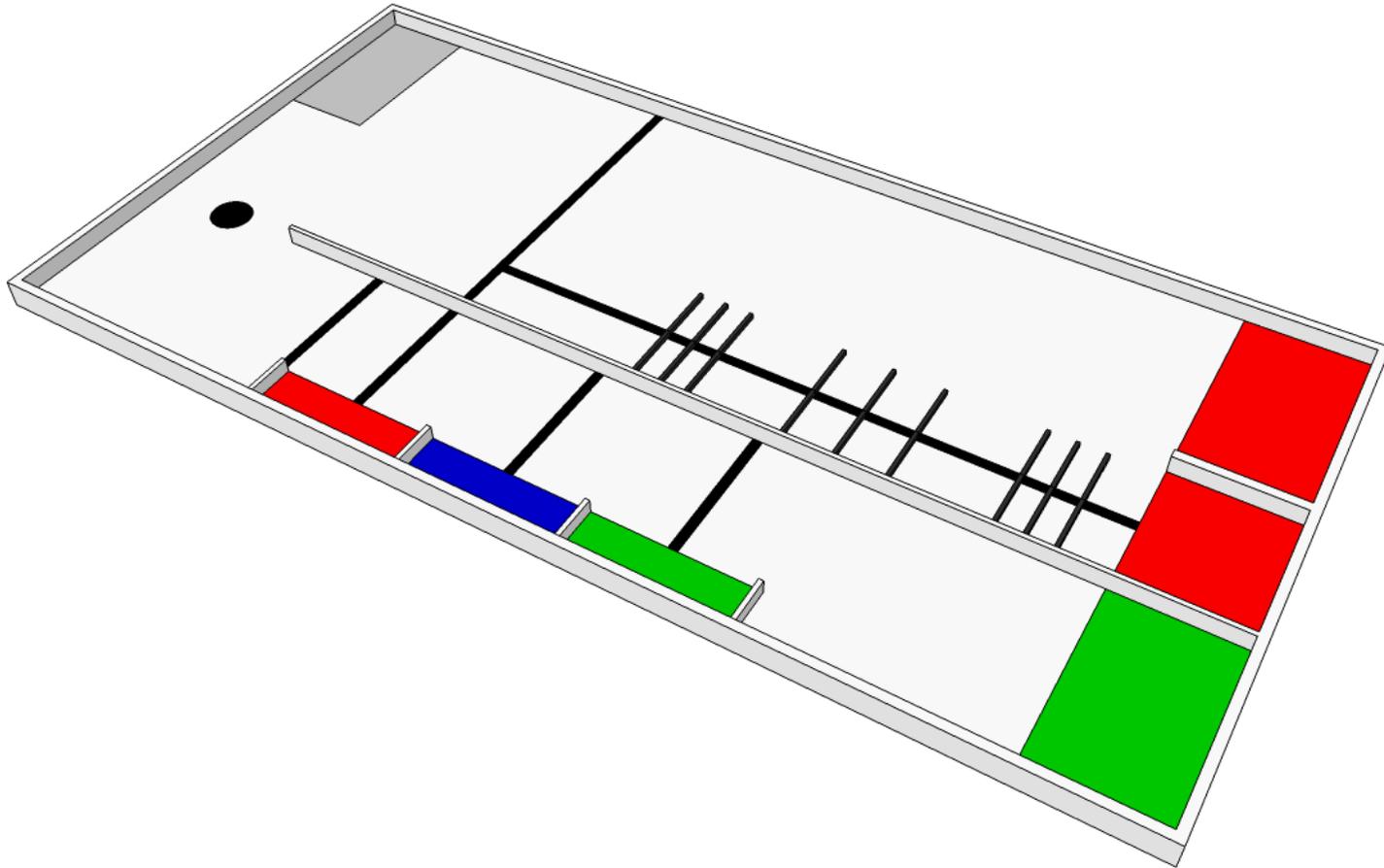
**BATIK**  
**THE COLOR OF INDONESIA**

# 1. Prelude

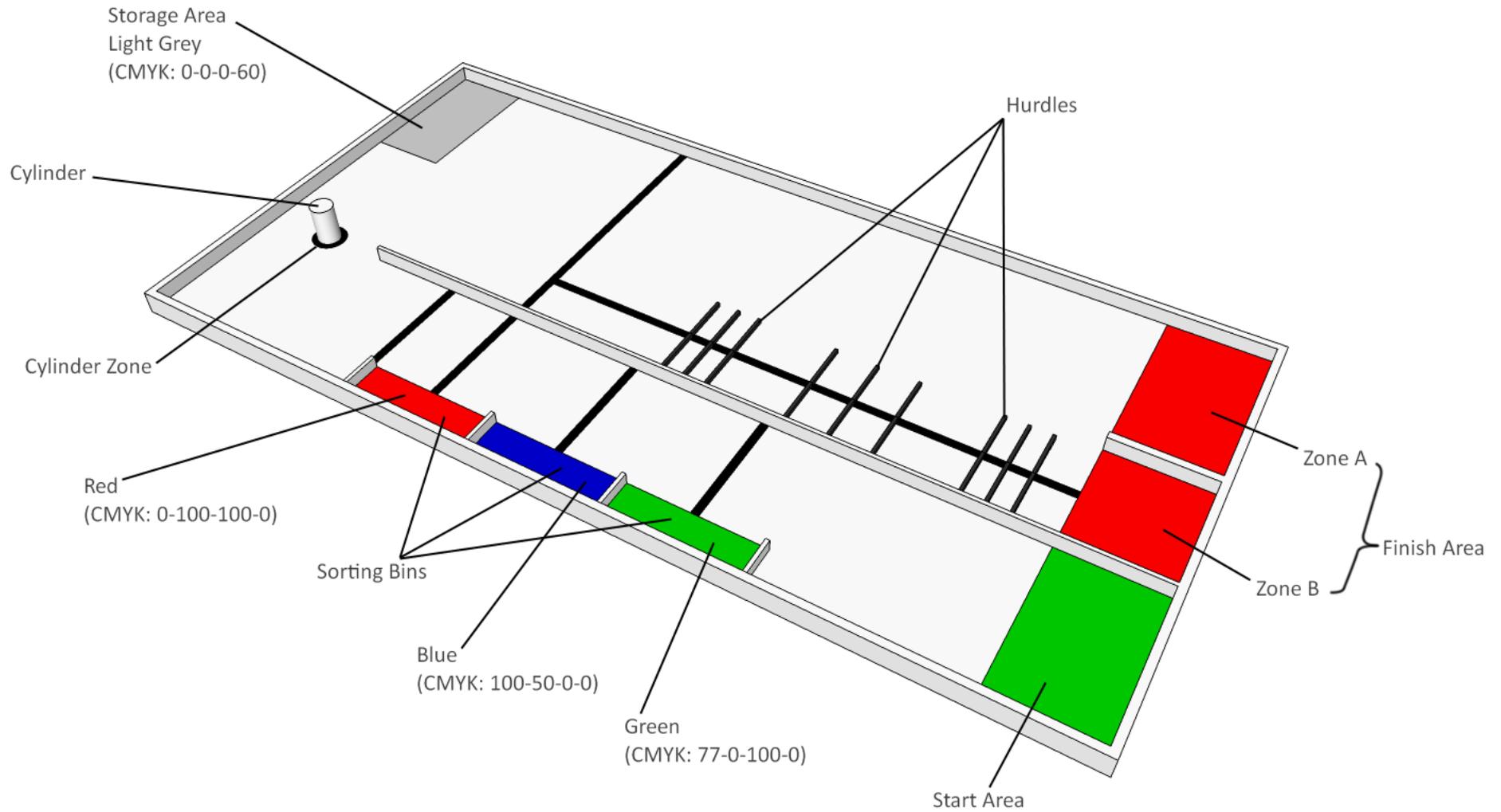
Batik is a cloth that is traditionally made using a manual wax-resist dyeing technique. In one form or another, batik has worldwide popularity. Now, not only is batik used as a material to clothe the human body, its uses also include furnishing fabrics, heavy canvas wall hangings, tablecloths and household accessories. In Indonesia, batik popularity has had its tidings. Historically, it was essential for ceremonial costumes and it was worn as part of a Kebaya dress, which was commonly worn every day. The existence and use of batik was already recorded in the 12th century and the textile has since become a strong source of identity for Indonesians. UNESCO designated Indonesian batik as a Masterpiece of Oral and Intangible Heritage of Humanity on October 2, 2009. (Wikipedia)

## 2. Challenge

### 2.1. Game Table in 3D



## 2.2. Table Definitions



## 2.3. Challenge Objects

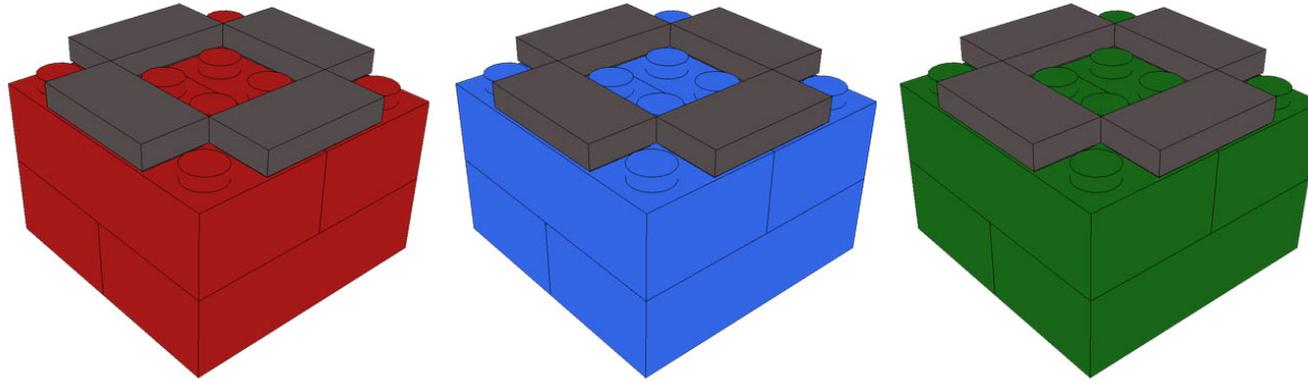


Figure 1. Color Objects (4×4×2 brick made out of 2×4 LEGO bricks with 1×2 tiles on top).

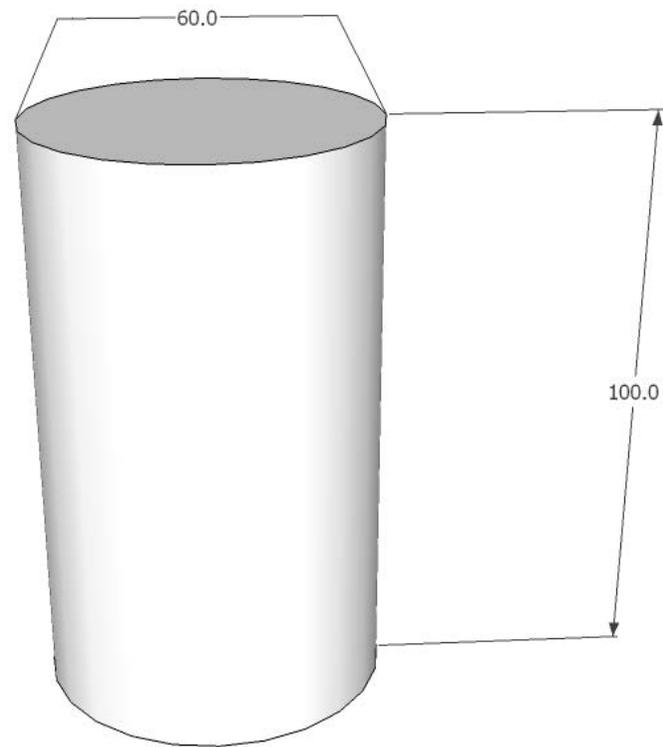


Figure 2. The cylinder with a size of 60 mm (d) × 100 mm (h) each will be used. (It will be made out of PVC pipe, weighing about 70 g each)



Figure 3. The hurdles. (They will be made out from 2 LEGO Technic Brick 1x16)

## 2.4. Challenge Overview

In the start area, the robot will carry 5 color objects for the challenge. The colors of the objects are: Red, Blue, and Green. The robot has to move from "Start" (green area). Along the way, the robot has to place the 5 randomly sequenced color objects into the correct color sorting bins (also determined randomly). Then the robot has to move the cylinder from Cylinder Zone to Storage Area, and enter the "Finish Zone A" or "Finish Zone B".

## 3. Match Definition

### 3.1. Rules & Regulation

1. Multiple programs in the robot are allowed. For scoring round, the participants are only allowed to choose program and press the enter button to run it. Participants are not allowed to make any additional input or setting to the chosen program.
2. The maximum dimensions of the robot before it starts are 250 mm × 250 mm × 250 mm. After it starts, the dimensions of the robot are not restricted.
3. The robot has to be placed within the Start area. No part of the robot is allowed to exceed the "Start" area before the match is started. When participants have arranged the physical position of the robot to their liking, the judge will give the signal to start.
4. At the start of each round, the sequence of the color objects and the color position of sorting bins will be randomized. The Sequence of the color objects and position of sorting bins will be fixed for all participants for that specific round.
5. The "Finish Area" is divided in two zone, "Zone A" and "Zone B" (see Table Definitions 2.2).
6. The robot's mission is to begin from the Start area, carrying 5 color objects and place them completely into the correct sorting bins in the correct sequence, pushing/moving the cylinder outside of the Cylinder Zone completely and move it completely into the Storage Area in standing vertical position, and enter the Finish area completely. The robot is considered to have entered Finish area completely if all parts of the robot that are in contact with the table are inside the Finish area.
7. Robot may detached or drop LEGO parts onto the track to assist in completing the mission objective. The main part of the robot (NXT, motor, sensors) will need to enter completely the "Finish Area" as described in point 6.



No part is in the "Finish Area"

Not finish completely

Finish completely

8. Before a match is started, participants will have the opportunity to load/arrange the 5 color objects in the robot anyway they want. The color objects may not be loaded or re-arranged after the match has started.
9. The robot must place 5 color objects into the sorting bins in the correct sequence (the sequence will be randomized). To get the "Placed in the correct sequence" score, the objects must be placed one at a time in a way that could clearly be seen by the judge. If the sequence is not clear (i.e. the robot placed two objects at one time), the judge will have the final decision to give the score.
10. Your attempt and time will end if:
  - a. The robot is touched by any team member after it starts.
  - b. The challenge time (2 minutes) has ended.
  - c. The robot has entered the Finish area completely.
  - d. Participant call for "Stop" of the match.
  - e. Violation of the rules and regulations herein.

## 3.2. Scoring

1. Scores will only be calculated at the end of the match.
2. Placing a color object into its matching colored bin = 10 points (max 50 points).
3. All color objects placed in the correct sequence = 10 points.
4. Moving/pushing the cylinder out of Cylinder Zone completely = 10 points.
5. Moving/pushing the cylinder into the storage area completely:
  - Cylinder in standing vertical position = 10 points.
  - Cylinder not in standing vertical position = 5 points.
6. The robot enter the Finish area completely:
  - In Zone A = 10 points.
  - In Zone B = 20 points.
7. Maximum score = 100 points.
8. If teams acquired the same score, ranking is decided based on the fastest time.

Color Object (5 objects)		Cylinder Position			Finish Position	
Placed correctly into the color bins	Placed in the correct sequence	Outside original position completely	Into storage area completely		Zone A	Zone B
			Standing Vertical	Not Standing Vertical		
10 pts per object	10 pts	10 pts	10 pts	5 pts	10 pts	20 pt

Table 1. Score allocation.

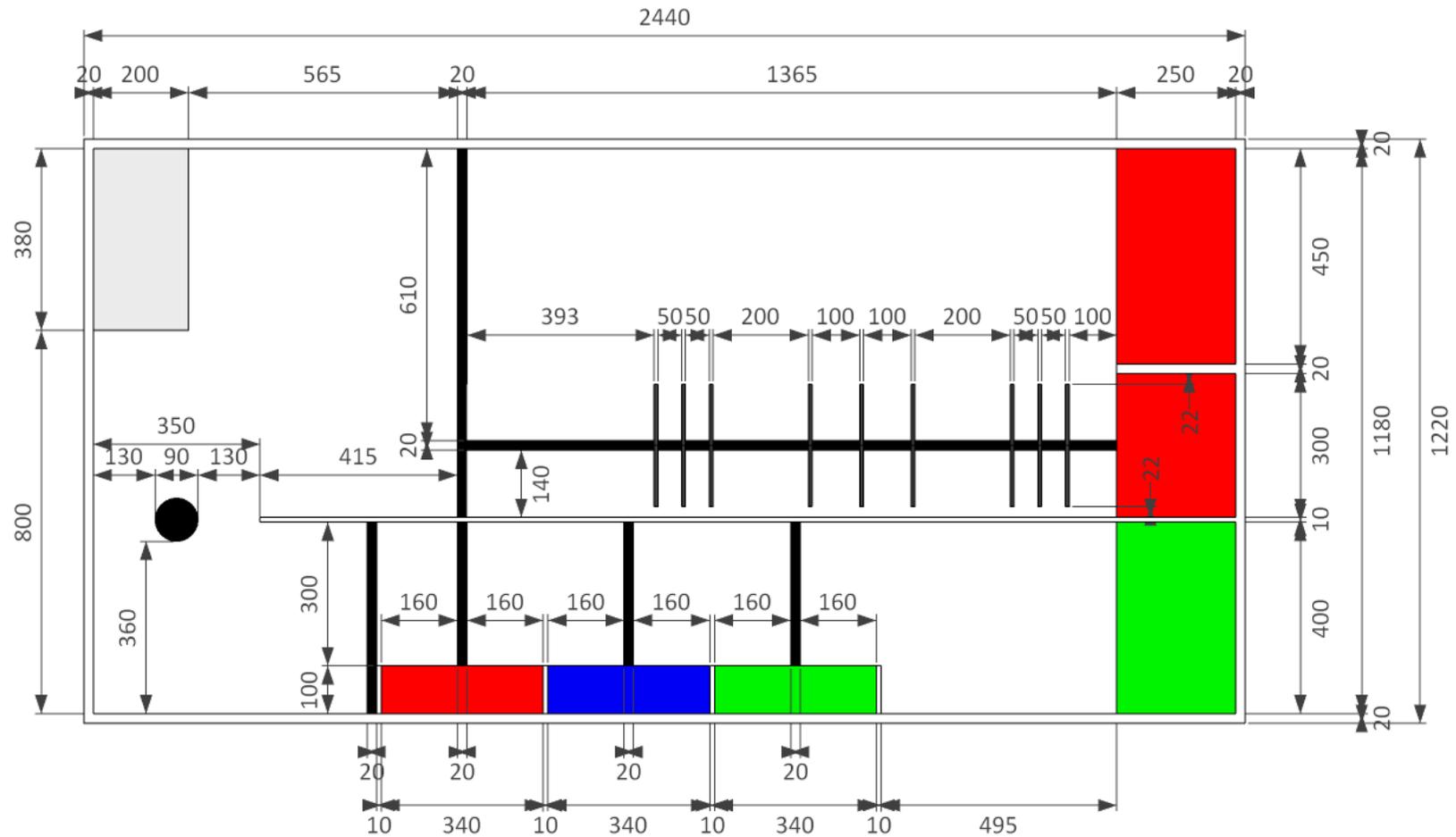
### 3.3. Scoring Example

		Round 1 (Red, Blue, Green, Blue, Green)		Round 2 (Blue, Green, Green, Red, Blue)		
		Team A	Team B	Team A	Team B	
Color Object	Placed correctly color objects into the color bins	5 object (5×10 pts = 50 pts)	4 object (4×10 pts = 40 pts)	4 object (4×10 pts = 40 pts)	3 object (3×10 pts = 30 pts)	
	Placed in the correct sequence	Yes Bonus: 10 pts	No Bonus: 0 pts	Yes Bonus: 10 pts	Yes Bonus: 10 pts	
Cylinder Position	Outside original position completely	10 pts	10 pts	10 pts	10 pts	
	Into storage area completely	Standing Vertical	Yes (10 pts)	Yes (10 pts)	No (0 pts)	Yes (10 pts)
		Not Standing Vertical	No (0 pts)	No (0 pts)	Yes (5 pts)	No (0 pts)
Finish Position	Zone A	No (0 pts)	Yes (10 pts)	No (0 pts)	No (0 pts)	
	Zone B	Yes (20 pts)	No (0 pts)	Yes (20 pts)	Yes (20 pts)	
Mission time		01:10.18	01:05.20	0:58.34	0:55.20	
Final score		100 pts (50+10+10+10+0+0+0+20)	70 pts (40+0+10+10+0+10+0)	85 pts (40+10+10+0+5+0+20)	80 pts (30+10+10+10+0+0+20)	

Table 2. Scoring example.

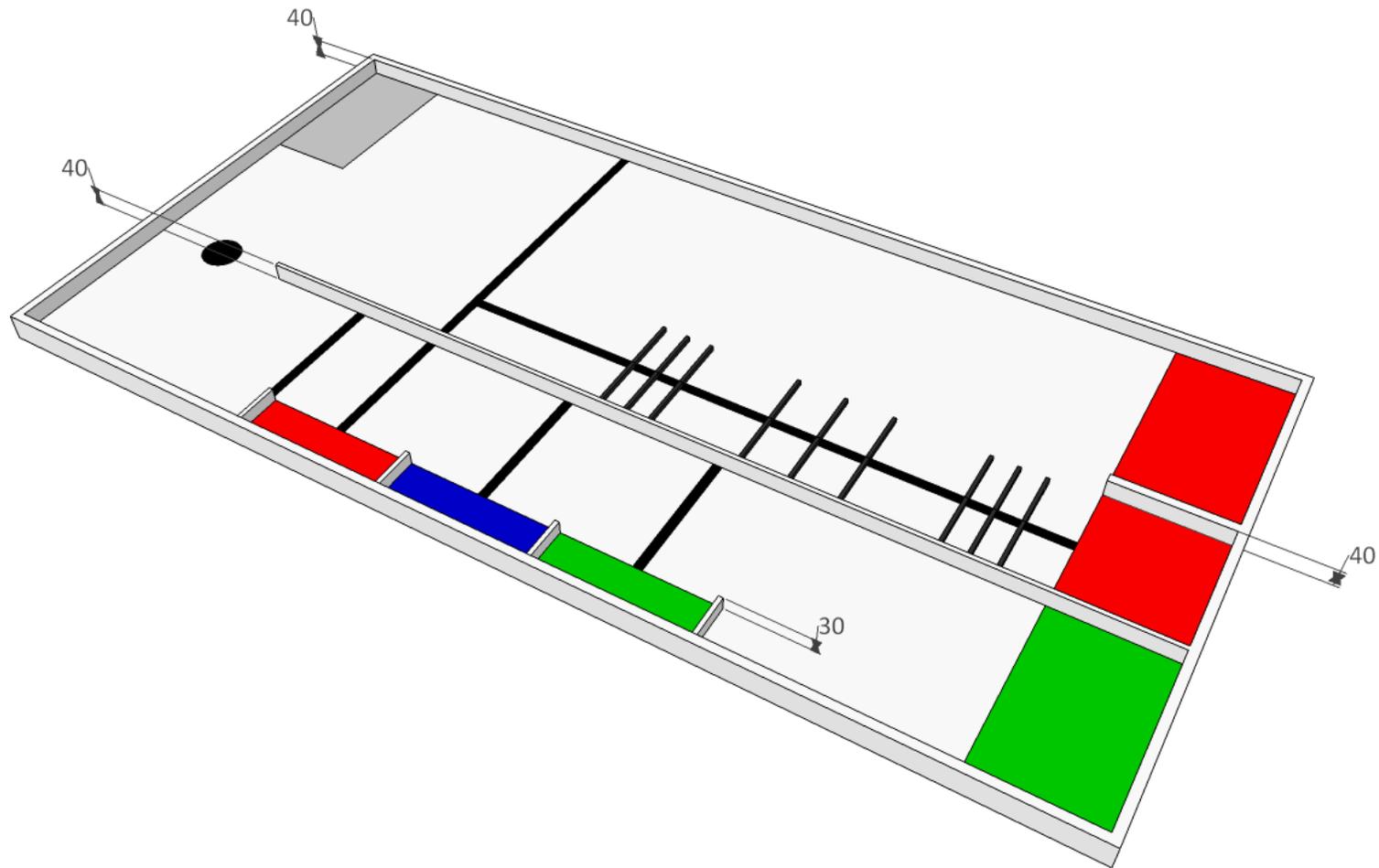
## 4. Table Specifications

### 4.1. Horizontal Dimensions



- All size is in mm.

## 4.2. Vertical Dimensions



- All size is in mm.

### 4.3. General Information

1. The dimension of the playing field is 2440 mm × 1220 mm..
2. The playing field is surrounded by boundary walls 40 mm in height and 20 mm in width.
3. The error tolerance of the field is  $\pm 50$  mm.
4. The table base color is white, except for "Start", "Finish", Cylinder Zone, Sorting Bins and Storage Area.
5. The playing field consists of Hurdles, black lines, and separator walls.
6. The width of the black line in the playing field area is 20 mm  $\pm$  1 mm. Color objects are made of 4×4×2 brick made out of 2x4 LEGO bricks with 1x2 tiles on top (see Figure 1).
7. The cylinder size is 60 mm (diameter) × 100 mm (height). It will be made of PVC pipe, weighing about 70 g each (see Figure 2).
8. The Hurdles will be made of 2 LEGO Technic Brick 1x16 (see Figure 3).

## 5. Building Instruction

### 5.1 Building Steps for "Color Object"

