

## Simple & Powered Machines Category

# Ball in Box

#### Game Description, Rules, and Scoring

### 1. General Rules

#### 1.1. Team

- 1. A team consists of two (2) members and/or one (1) coach.
- 2. Participants are elementary school students, whose date of birth falls on/or after January 1, 2005.

### 1.2. Material

- The set used is Simple & Powered Machines base set (9686). Team are allowed to use other LEGO Education set beside 9686, however, the number and type of the components must matches of those available in one 9686 set (see appendix at the last page). The color of the components doesn't matter.
- 2. Teams should prepare and bring all the equipment they need during the competition.
- 3. Only ABC ALKALINE battery brand may be used, any other battery cannot be used



Eligible Battery for the competition

#### 1.3. Competition

- All LEGO elements in the box must be separated completely before the start of the competition, including minifigures, wheels and tires. Judges will check the state of parts before announcing the start of the competition.
- 2. Battery box should be left open without its covers during the competition.
- 3. Competition is divided in three stages:
  - Assembly & Testing stage (45 minutes)
  - Qualification stage
  - Final stage (top 8 teams)

4. After the Assembly & Testing stage, teams must close their boxes with all the unused LEGO parts inside the box. The box must remain closed for the rest of the competition and teams are not allowed to take any parts from the boxes.

#### 1.4. Game Flow

- 1. Qualification stage:
  - At each match, two teams will play side-by-side in pairs. The order of teams to play is determined by a draw.
  - Final score and time of each team will be recorded.
  - Eight (8) teams with the highest score will proced to the Final stage. If two or more teams have the same score, ranking is decided by the shortest time recorded.
- 2. Final stage:
  - The Final stage is a knock-out stage. This means, at the end of each match, team with more points is the winner of that match and will advanced to the next match.
  - At each match, two teams will play against each other side-byside in pairs. The order of teams to play is determined by a draw.
  - Below is the illustration of how to get winners in Final stage:



### 2. Challenge

### 2.1. Overview

The challenge for this game is to build a 2-in-1 robot to move from one spot to another, throw balls, and move back to the Start Area.

#### 2.2. Gameplay

- 1. Before the match starts:
  - The robot must start from completely inside the Start Area (completely behind the black line).
  - A member of the competing team will take position behind the Start Area, while another member at the Throwing Area.
  - 5 ping-pong balls are provided in the Throwing Area.
  - After both teams ready in position, a judge will give signal to start the match.

- 2. When the match is on:
  - Two teams will play in pairs within the same time limit (2 minutes).
  - Touch Penalty will be given if the robot is touched outside of the Start Area, Transit Area, and Throwing Area. For example, if the robot gets stuck in the table while moving from Start Area to Transit Area (or vice versa), teams are allowed to bring it back by hand to the Start Area (if it is moving to the Transit Area) or to the Transit Area (if it is moving to the Start Area) for a retry.
  - The robot is considered to have reach the Start Area or Transit Area if any part of the robot that is touching the floor is inside the area.
  - After the robot has reached the Transit Area, teams are allowed to make modifications to the robot for the next task: throwing balls.
  - Each team is given 5 ping-pong balls to throw to the Target Box. The robot must throw one ball at a time. Number of attempts to throw balls cannot exceed 5 times.
  - Bouncing balls are allowed as long as it not caused by the movement of the participants. Using any body parts or any other material to deflect the ball is prohibited.
- 3. When the game is finished:
  - Score is calculated after the match has ended.
  - Score is calculated based-on the following: Reaching the Transit Area, number of ping-pong balls in the Target Box, number of Touch Penalty, and number of attempts to throw balls.
  - Score on how many balls is inside a team's box only counts the ball thrown by that team. A ball from the other team that accidently got into the box does not count.
  - If a team did not finish when the time ends, that team will still get points from the mission they completed but will have 2 minutes as their mission time (0 remaining time).
  - If teams have the same score, ranking is decided by the shortest time recorded.

#### 2.3. Rules & Regulation

- 1. Maximum dimension of the robot is 25x25 cm. There are no height restriction.
- 2. Robot's movement:
  - The robot must move using a legged mechanism. Movement using wheels that are powered by a motor (either directly or through gearings or other method) is not allowed.
  - Example comparison between legs and wheels:



Parts of legs which touch the floor must not go higher than its driving axle. Make sure the "shoes" do not spin.

• Example of legged mechanism can be seen in the picture below:



The robot above has 4 idle wheels and 2 paddles (with rubber tires as shoes for friction purpose). The 4 idle wheels are only used to make the robot stays upright in place while the 2 paddles make it crawl forward or backward.

Other type of legged mechanism are allowed (paddling, walking, etc).

3. Throwing

#### Keep it on the floor

- You need to keep the throwing robot on the floor inside the Throwing Area
- Do not hold it above the floor.
- Teams are allowed to control or aim the robot by hand.

#### Throw or flick? It is up to you.

- Be creative to design and build a ball throwing robot as long as it is powered from it's own potential energy stored in a form of rubber band(s) (they(it) work(s) like spring).
- Do not use any of your body parts as source of potential energy or other kind of energy to throw or flick the ball toward Target box.

#### One ball at a time.

- You can only throw the ball one at a time.
- You are only given 5 ping-pong balls and 5 attempts to throw the balls. You may not take back the ball which fails to enter the box.
- Example of how to throw the balls can be seen below:



This is NOT OK. You are holding the machine above the floor even though it is behind black line.
This is NOT OK. You are trying to shoot 2 (two) balls at the same time.
This is NOT OK. You are holding the machine above the floor.

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## 3. Scoring

The scoring allocation is as follows:

Condition	Score	
Reach the Transit Area	25 points	
Number of throws	5 points per throw	
Number of ping-pong balls in Target Box	10 points per throw	
Touch Penalty	-3 points per touch	
Return to Start Area	15 points	

Scoring example: Robot reaches the Transit Area, used all 5 chances to throw, 3 ball inside the Target Box, returned to Start Area, but touched the robot 3 times outside the Start Area, Transit Area, and Throwing Area.

Condition	Score	Total
Reach the Transit Area	25 points	25 points
Number of throws	5 × 5 points	25 points
Number of balls in Target Box	3 × 10 points	30 points
Return to Start Area	15 points	15 points
Touch Penalty	3 × -3 points	-9 points
Final Score		86 points

# 4. Specification 4.1. Playing Field



The Target Box is the standard tray of 9686 set with its lid functioning as bouncing pad. See the picture below for illustration of the Target Box.



Target Box

### 4.2. Appendix

Below is the content list of the 9868 set:

2 MA 9686

#### 4.3. FAQ

- Q: Can I bring a tool to help me aim my throwing robot?
- A: Yes, as long as the tool is part of the robot that reach Transit Area.
- Q: Can I be a single player in this game?
- A: No. You have to have 2 persons in your team and a coach.
- Q: When do I get negative points?
- A: You get negative points or Touch Penalty each you touch your robot when it is outside Start Area, Transit Area, and Throwing Area.
- Q: Can I have more than 5 attempts to throw balls to the Target Box?
- A: No. Each team will only have 5 throws, regardless how many are successful.