



## Mission -TORCH RELAY-

### Overview

Within the competition time (3 minutes), a robot carries ping-pong balls, which are placed onto the 10 caps, to the top of 5 beverage cans as many as possible. At the end of the competition time, points are given based on the number of ping-pong balls held by the robot, the number of ping-pong balls placed on the five beverage cans, and the specified movement of the robot. Since 2021 is the Tokyo Olympic Year, it is a competition task that looks like a torch relay.

### Tournament Rules

- Games will be conducted on online live using Zoom.
- Simultaneous battles will be held in a tournament. However, in the case of game between teams belonging to the same school, the game will be held one team at a time.
- Tournament blocks will be decided according to the entry order. Moreover, it will be decided so that the game against the same school can avoid as much as possible.
- The view of entire competition field will be broadcasted by Zoom with a fixed camera prepared by each school.

### Field Layout

Competition field should be prepared at each school. Figure 1 shows the field layout of top view, Fig. 2 shows the view of 3D, and Fig. 3 shows the dimensions. With electrical tape, beverage cans, and PET bottle caps, you can create competition field easily.

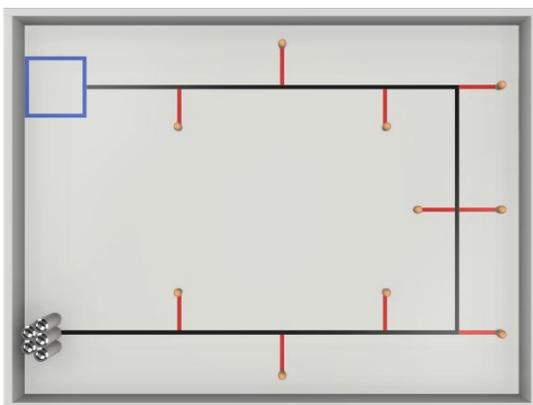


Fig. 1 Top View

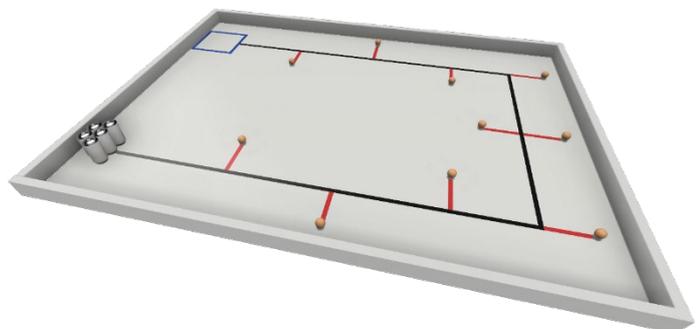


Fig. 2 3D View

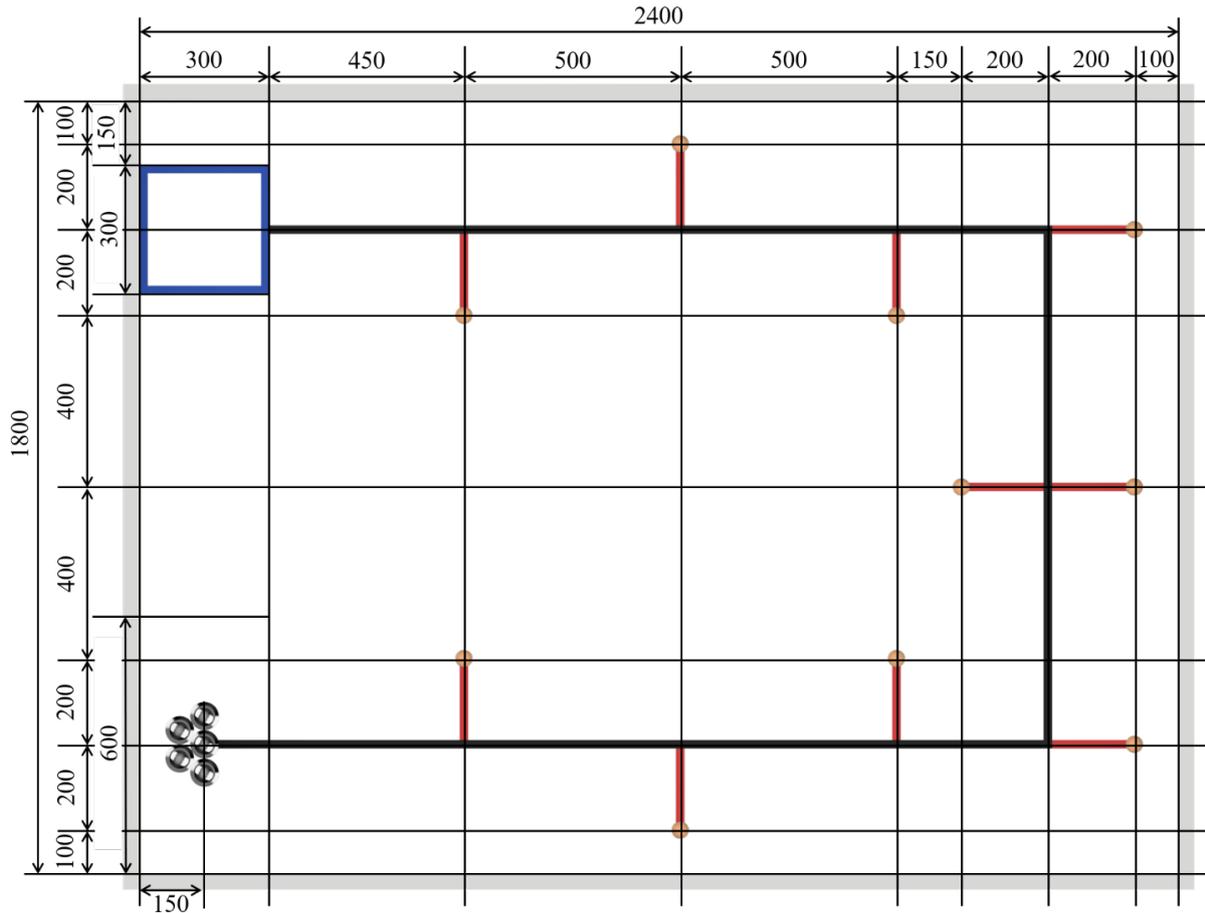


Fig. 3 Size

- (A) Use a white color sheet for the floor material. Any materials (tablecloths, plastic paper, etc.) are also available.
- (B) Enclose the field with a fence within a height of 90 mm, but it is sufficient if the range of the field can be confirmed by enclosing it with electrical tape.
- (C) Enclose the start area with electrical tape (width 19 mm, blue color) so that it has a size of 300 mm square.
- (D) Use electrical tape (width 19 mm, black and red color) for the black and red color lines drawn on the field.
- (E) Fix the PET bottle cap (no manufacturer or color specified) to the field with double-sided tape.
- (F) Use ping-pong balls (size 40 mm, orange color).
- (G) Place the ping-pong ball on the cap of the PET bottle as shown in Fig. 4.
- (H) Cover the sides of five beverage cans (350 ml, not empty cans) with white paper and fix them with double-sided tape with bottom side up (Fig. 5).

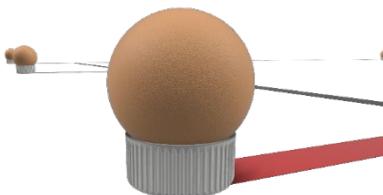


Fig.4 Ping-pong ball on the cap



Fig.5 Cauldron made of cans

## Regulations of making robot

- (A) Make a robot with only the parts included in one LEGO MINDSTORMS EV3 core set.
- (B) Do not modify the parts.
- (C) Do not use tapes and adhesives.
- (D) Must be 300 x 300 mm size at the time of start and retry start when viewed from directly above. There are no restrictions on height and weight.
- (E) Not allowed separable type robot.
- (F) Not allowed to use remote control the robot.
- (G) Do not use an external power supply during the competition time.
- (H) Allow to use any programming software.

## Game Rules

- (A) The competition time is 3 minutes, and control the timer by the committee secretariat.
- (B) Only one player selected in the team can touch and operate the robot during the competition time.
- (C) The player places the robot within the start area and receives a regulation check (mainly check the size of the robot) by the referee.
- (D) After the start call (countdown screen and beep sound), the player starts the robot by press the button on the EV3 main unit or by using the sensor included in the core set.
- (E) If the referee declares a false start, it will be a "Flying Start (restart)". In this case, the competition time control and conditions of the field will be initialized, and only the false starting team will start the robot with a delay of 5 seconds. The team that makes a false start again will be disqualified.
- (F) After the start, the player cannot touch and operate the robot except for "retry start" and "pullover".
- (G) 'Retry' can be executed at any time, and the moment the player touches the robot, it is judged as a 'retry'.
- (H) The maximum number of 'retry' is 2.
- (I) At the time of 'retry', the player may remove the ping-pong ball held by the robot or change the holding location.
- (J) The condition of holding the ping-pong balls is that the ping-pong ball is not in contact with the field, that is, it is being lifted by the robot.
- (K) When it is judged as a 'retry' by the referee, the player must immediately move the robot to the start area. After that, if the player has undergone the referee's regulation check, it is allowed to restart at any time.
- (L) After using up the two retries, or if the player wants to stop the robot at any place, it can stop the robot by declaring "pullover" to the referee.
- (M) Switching the program (but only the one downloaded to the EV3 main unit) or changing the position of the parts at the time of retry are allowed, but do not remove the parts.
- (N) At the end of the 3-minutes competition time or at the end of the game due to the "pullover declaration" of both teams:
  - \*Scoring (the total points are up to 47 points)
    - I. The number of ping-pong balls held by the robot (1 point per a ball)
    - II. The Number of ping-pong balls placed on the can (4 points per a ball)
  - And during the competition time:
    - III. The robot touches the can while holding 10 ping-pong balls (7 points).

- (O) The team that gets higher point wins.
- (P) If the case of even score, rematch will be done with initial field states.
- (Q) If the case of even score at rematch, the winner will be decided through discussions with the executive committee member.

## Referee

- (A) All games will be controlled by the referee at each school
- (B) If it is determined that there has been a violation or prohibited act, the referee declare it and disqualify the team immediately.
- (C) If there is any doubt about the judgment, the team can challenge the judgement immediately. After the start of the next game, any challenge is not accepted.
- (D) The referee will respond to the challenge. But the referee can ask for advice on it to the executive committee through Zoom.

## Prohibitions

If it is judged that the following actions have been taken, then the team will be disqualified.

- (A) Restart after exceeding the upper limit of retry (determine whether the entire robot has left the start area).
- (B) During the competition time, members except the player touch the robot or the competition field.
- (C) Take the robot and leave the field.
- (D) Download a new program to EV3 main unit.
- (E) Operate the robot by remote control.
- (F) The robot goes out of the competition field (determined by whether the parts of the robot are touching the floor outside the field).
- (G) The robot is disassembled or separated (if it is physically connected by a cable, etc., it is not considered to be separated).
- (H) Destroy the field intentionally.
- (I) Do not follow the instructions of the referee.
- (J) Use abusive language to the referee.

**Note:** Game rules may be updated without notice. Please always get the latest game rules from the SMART official website (<https://www-sky.ee.tokushima-u.ac.jp/lab/smart/>).

2021.10.01          Game rules Ver.1.0 Published

2021.10.11          Game rules Ver.1.1 Published (Expression of Game Rules (N) modified)