

Line Following Challenge Official Rules (RoboRAVE Kaga Japan 2018)

● **Goal:** To design, build, and program a line following robot that can follow a black line on a white background to a tower and deliver at first, at least one (1) ball and then return to its starting point. Then in the remaining time (of 3 minutes) to return to the tower (as many times as needed) to deliver a **set number** (not over, not under) of balls as per their division's requirements.

● **Who Can Play:**

Teams of 2 to 4 players in separate divisions , typically:

- Elementary School
- Middle School
- High School

● **Required Materials:**

- Autonomous robot (any platform, costing \$ 1,500 USD or less, and meets the following design constraints, which will be verified during check-in:
 - **Volume of the robot must NOT exceed 65,030 cubic cm.** Click [HERE](#) for video.
- Multiple sensors and processors are allowed.

● **Challenge Track Specifications:**

- White PVC Vinyl Background
- Elementary School Division – No intersections, 1.25cm black line
- Middle School Division – One intersection, 1.25cm black line
- High School Division – Two intersections, 0.75cm black line
- The Tower: All divisions use the same – 20cm tall x 10cm wide x 35cm long tower with a 10cm x 10cm opening at the top and an open back to allow the balls to roll out during delivery. The tower is held firm to the track by a strip of Velcro tape. (dimensions are approximate)
- The competition Tower and Tracks cannot be modified for any reason.

All Challenge Dimensions are Approximate

The challenge may be held in areas with natural light present which may change the lighting conditions of the track. **Be prepared** to engineer around this natural condition.

● **General Rules of Play during a Line Following Heat:**

1. A line following program must control your robot's motion.
2. The robot has 3 minutes to complete tasks.
3. Only Players can operate and manipulate the robot during the heat (Players play, Coaches coach.)
4. **The tower cannot be touched by any person during the delivery.**
5. **No scooping** of balls out of the tower by any person during payload delivery.
6. Touching the robot at any time requires it to be picked up and returned to **home**.
7. Official tracks will be available to practice on, you may runs as much as you wish on the practice tracks.
8. You will get **10 official scored runs** during the challenge scoring period.
9. The **total of your 5 highest official scores** are used to determine tournament selection.

● **Scoring:**

The overall score is a combination of points earned from:

- Running the track to the tower
- Delivering at least one ball
- Returning back home
- Delivering the required number of balls

Each division will have a set number of balls to deliver:

- **Elementary School - 137**
- **Middle School - 201**
- **High School / Big Kids - 387**

See the Scoring Matrix for your division below for details on the scores assigned during your first trip to the tower and back.

A successful run is defined as:

- The robot traversing the track from Home to the Tower, delivering **at least 1 ball** and traversing the track back home. These balls must then be discarded.

After a successful run, on additional runs:

- The robot traverses the track from Home to the Tower and delivers the required number of balls . The robot **does not** have to traverse the track back home.

If the number of balls is **under** the required number of balls, then **that number is your ball score**.

If the number of balls is **over** the required number of balls, then the extra will be **subtracted** from the required number resulting in your ball score.

● **Scoring Matrix:**

	Leaves Home	Turns @ 1st "T"	Turns @ 2nd "T"	Stops @ Tower	Delivers a Ball	Starts Back Home	Turns @ 1st "T"	Turns @ 2nd "T"	Returns Home	Total
ES	50	NA	NA	100	100	50	NA	NA	100	400
MS	25	25	NA	100	100	25	25	NA	100	400
HS	25	25	25	50	100	25	25	25	100	400

Bonus Balls:

- If the number of balls is **under** the required number of balls, then **that number is your ball score** .
- If the number of balls is **over** the required number of balls, then **the extra will be subtracted from the required number resulting in your ball score**.

● **Tournament Scoring:**

- The top eight teams from each division will compete in the final tournament.
- Advancing teams will be seeded into the tournament bracket according to their aggregate score (see bracket below).
- If both teams finished with the same score, the team with faster time wins the round.

"RoboRAVE Kaga Japan 2018" 8 Team Tournament Bracket

Tournament Placing

- The losing teams from Round 1 will place 5th through 8th in accordance with their aggregate score coming into the tournament.
- The losing teams from Round 2 will face each other in Round 3 to determine the 3rd and 4th place winners respectively.
- The winning teams from Round 2 will face each other in the Championship Round (which may be run at the same time as Round 3) to determine the 2nd place winner, and the Tournament Champion.

