



# Journey Junior

## RoboFinist competition rules

*Version 4.0 dated February 2, 2025*

### 1. General Provisions

The race is run by each team independently. One team fields one robot.

#### 1.1. Task Description

Within one run, the robot must successively complete the tasks of:

- «Line Follower with a fixed obstacle»;
- «Maze»;
- «Line Follower with a slide»;
- «Kegelring»;

and stop in the finish area of the last field.

#### 1.2. Restrictions

A team must meet the following requirements, unless otherwise established by the Organizing Committee of a particular Event:

- the number of participants in the team is 3 or less (the number of coaches/team managers is not limited)
- the oldest member of the team is 12 years old or less in the year of the competition.

For additional restrictions in the «Educational Kits» category see the General Competition Rules.

### 2. Requirements for the Robot

The robot must meet the following requirements:

- width - not more than 250 mm;
- length - not more than 250 mm;
- height - not limited;
- weight - not more than 1 kg.

The robot must be absolutely autonomous; remote control in any form is prohibited.

The program run by the robot must be written by the participant only.

The robot's dimensions may vary during the competition, but must not exceed the maximum allowable parameters.

It is forbidden to use any adhesive gadgets to collect skittles.

### 3. Specifications of the Field

The «Journey Junior» field consists of 4 consecutively placed fields (see Fig. 1).

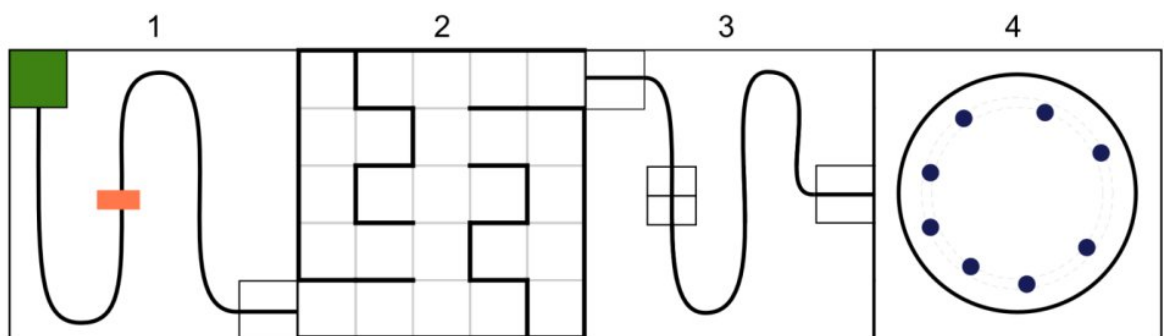


Figure 1. «Journey Junior» field layout. 1 - «Line Follower with a fixed obstacle», 2 - «Maze», 3 - «Line Follower with a slide», 4 - «Kegelring».

The starting area is a square of green color with a side of 300 mm, bounded by a black line along the perimeter with a thickness of at least 10 mm.

The «Line Follower» fields are white rectangular surfaces with black lines of any shape drawn on it:

- the line is 30 mm wide;
- the line curvature radius is over 130 mm at any point of such line;
- the minimum distance at which the line can approach the end of the competitive field must be at least 150 mm (when measured from the line axis).

#### 3.1. Line Follower with a Fixed Obstacle

The starting area of the first field is green.

The obstacle bypass section is a straight part of the line bounded by two adjacent white markers in the form of squares with a side of 10 mm, drawn on the line no closer than 150 mm from its rounded parts, starting/finish areas and other markers.

A fixed obstacle - a rectangular parallelepiped with dimensions 120 x 250 x 65 (+/-5) mm (width x length x thickness) and weighing more than 1 kg – is installed in the obstacle bypass section. A brick of a single size according to GOST can be used as an obstacle.

The obstacle is installed on the smallest side by area, width perpendicular to the line in any place of the bypass section not closer than 150 mm to the marker.

### 3.2. Maze

The Maze field is a square of 1500 mm x1500 mm and is conditionally divided into cells with the size of  $300 \pm 20$  mm (see Fig. 2).

The field surface is white.

Walls with height of 10 cm and a thickness of  $16 \pm 1$  mm will be arbitrarily installed between the cells by the Judge. Walls are also set around the whole perimeter of the maze except for the cells with the starting and finish areas. Gaps and overhangs with the size of up to 5 mm are allowed between the walls.

The Maze is configured according to the following rules:

- there is the only way to reach any cell of the Maze from any other cell of the Maze;
- the length of the Maze routes according to the “right-hand” or “left-hand” rules is at least at least 2 times longer than the shortest route;
- the lengths of the “right-hand” and “left-hand” routes are equal.

The starting area of the field is the first cell of the maze in the direction of travel. The maze finish area is the starting area of the next field.

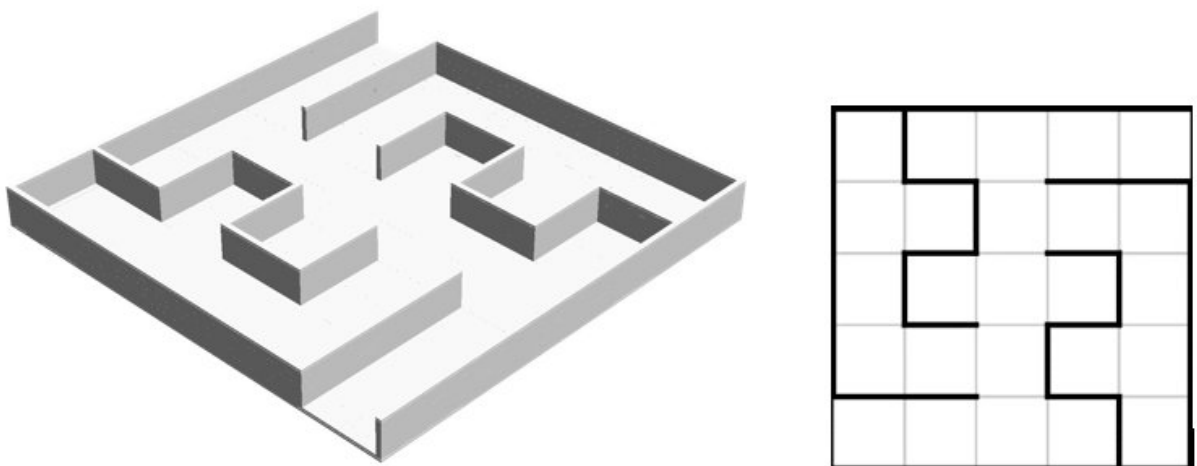


Figure 2. «Maze» field layout example

### 3.3. Line Follower with a Slide

On the straight part of the line, not closer than 100 mm from its rounded parts, an obstacle «Slide» is installed and fixed to the field, with its axis perpendicular to the line. The slide is a triangular prism with dimensions: length  $l = 600$  mm, width  $b = 300$  mm, height  $h = 100$  mm (see Fig. 3). The slide is marked with a black line identical to the one drawn on the polygon. The surface of the slide is white in color.

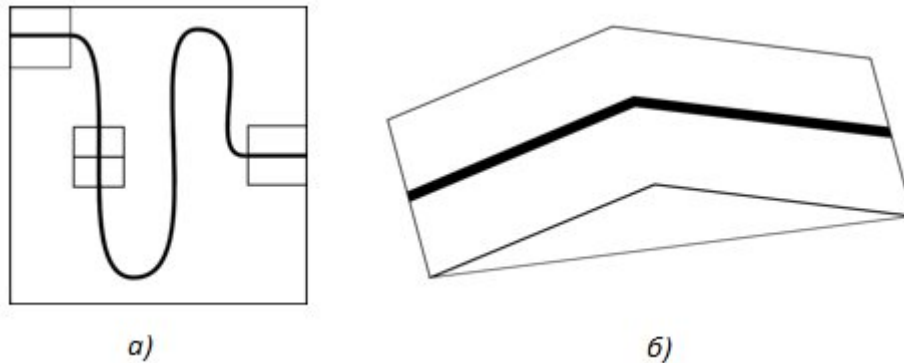


Fig. 3. «Line Follower with a slide» field: a) general view; b) slide

### 3.4. Kegelring

The field is a square of 1500mm x1500mm with a ring which is a circle with a diameter of 1000mm located in the middle. There is a black line 50 mm thick around the perimeter of the ring, which is not part of the ring.

The field surface is white.

8 skittles are randomly placed in the ring on the appropriate markers.

Skittles are rigid cylinders with a diameter of  $62 \pm 5$  mm, height of  $125 \pm 25$  mm and weight of  $30 \pm 10$  g. The skittles have a matte monochrome surface.

The skittles can be made from standard cans (330 ml) wrapped with paper.

The general view of the field and the layout of the skittles are shown in Fig. 4.

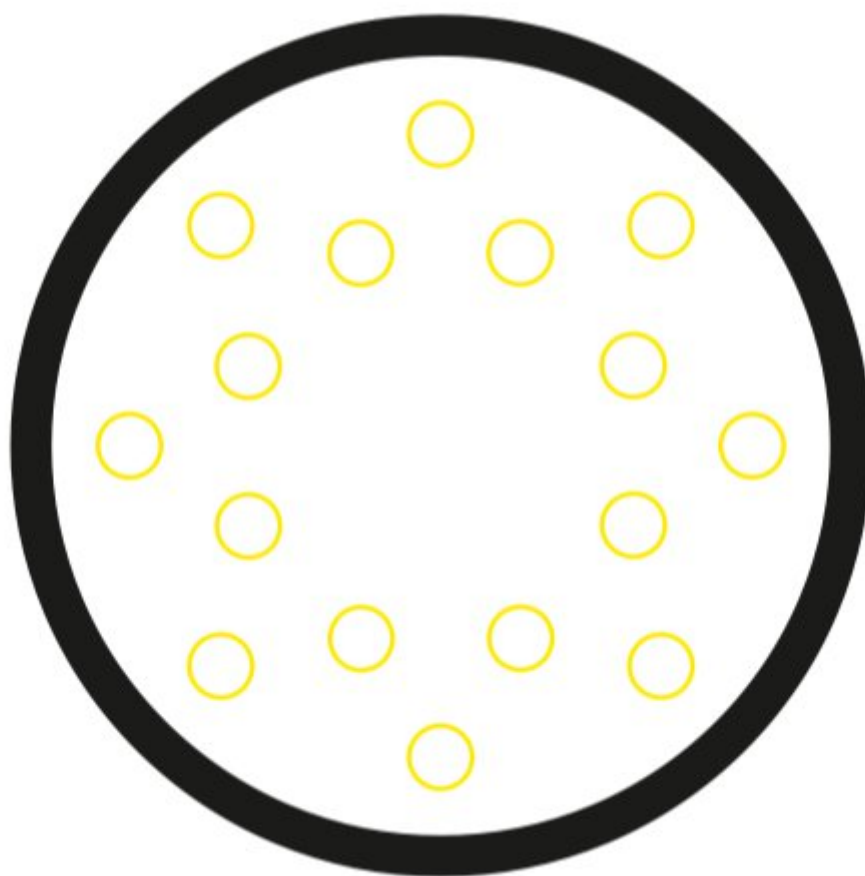


Figure 4. «Kegelring» field layout example

## 4. Contest Procedure

The robot must successively complete the fields' tasks, push the skittles out and stop inside the ring of the «Kegelring» field.

The maximum allowable time of the run is 3 minutes.

The run time is recorded at the moment the robot comes to a final stop inside the ring.

Each field has its own starting and finish areas. These areas are listed in Table 1 and shown in Fig. 5.

Table 1. The starting and finish areas

№	Field	Starting area	Finish area
1	Line Follower with a fixed obstacle	A	B
2	Maze	B	C
3	Line Follower with a slide	C	D
4	Kegelring	D	D

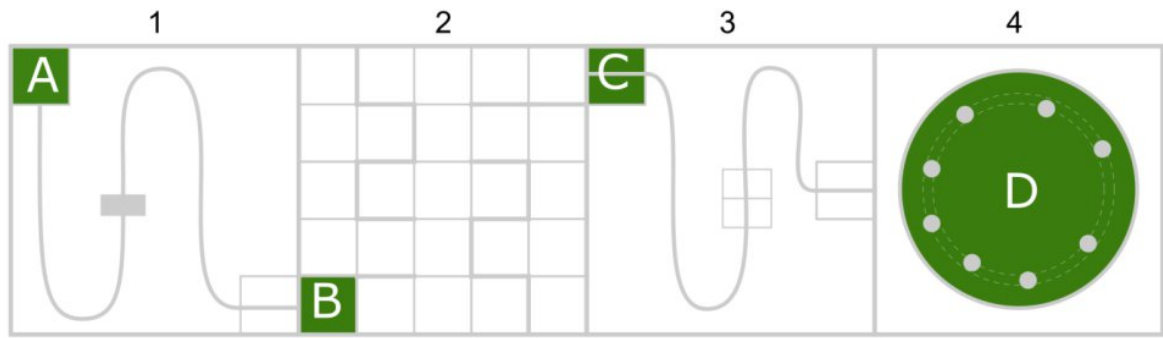


Figure 5. «Journey Junior» starting and finish areas

On the day of the competition, the Organizers may change the design of the field, as well as the arrangement and the number of elements without changing the order of the fields.

The number of attempts is determined by the Organizers on the day of the competition.

Before the attempt starts, all the participants place their robots to the Quarantine area. During the competitions, the participants may take robots from the Quarantine area only and at the referee's command only. After the run the participant places his/her robot back to the Quarantine area.

Before each attempt, the configuration of the fields will be changed. All participants must place the robots in the Quarantine before the changing of the fields' configuration starts.

Before the run starts, the robot is placed at the starting area of the first field so that none of its parts extend beyond the limits of such area.

The participant launches his/her robot at the referee's command. Time is counted from the moment the projection of the robot crosses the limit of the starting area.

The robot finishes performing a field task when it crosses the line which limits the finish area of such field unless otherwise provided by the field task.

The robot starts to perform a field task at the moment the previous field task is completed.

In case of failure to complete the task of 1, 2 or 3 field, the run is interrupted and the participant, with the permission of the Judge, manually places the robot in the starting area of any field. The time is not stopped and the field is restored to its original state.

At any time of the run the participant may verbally inform the Judge of the failure to complete the field task by saying: «Stop!», interrupt the run and place the robot in the starting area of any field.

The time of the run is recorded by the «start-finish» electronic system or by the Judge using the stopwatch. The recorded time is considered final.

The run is stopped in the following cases:



- the robot has fully completed the task;
- the time allotted for the run is over;
- the robot was disqualified.

The robot must be autonomous. The robot cannot be controlled by the participant in any way.

Half of the points will be awarded for the rerun. The number of reruns is unlimited.

## **4.1. Line Follower with a Fixed Obstacle**

The field task: the robot is to pass along the line marked on the field from the starting to the finish area, bypassing the obstacle in the bypass section.

The robot is considered to have failed the task if:

- the robot has lost the line;
- the projection of the robot is not above the line outside the bypass section with an obstacle;
- while bypassing an obstacle, the robot's projection did not cross the markers of the bypass section;
- the robot is bypassing an obstacle that does not exist;
- any robot's point of support has touched the surface outside the field.

## **4.2. Maze**

The field task: the robot is to pass through the Maze from the starting to the finish area.

The configuration of the walls changes after all participants have placed their robots to the Quarantine area or as decided by the Judge.

Just before each attempt, the configuration of the Maze walls will be changed.

The robot is considered to have reached the cell if its projection is inside the cell.

The robot is considered to have failed to complete the field task if the robot has not left the cell within 30 seconds.

## **4.3. Line Follower with a Slide**

The field task: the robot is to pass along the line marked on the field from the starting to the finish area.

The robot is considered to have failed the task if:

- the robot has lost the line;
- any robot's point of support has touched the surface outside the field.

## 4.4. Kegelring

The field task: the robot needs to stop inside the ring. During the task, the robot can push the skittles out of the ring.

Before the run, the participant places the skittles on the corresponding marks by him/herself.

The skittles are considered to be pushed out of the ring if no part or a part of its projection is in the ring. Points for pushed skittles are awarded at the moment they are pushed out of the ring and are saved if the robot has left the field.

Repeated execution of the task is prohibited.

The participant can remove the pushed skittles from the field by him/herself at any time.

## 5. Disqualification

The attempt is disqualified if:

- the robot was not placed in the Quarantine area before the changing of the Maze configuration;
- robot is not autonomous (human is in control of the robot);
- participant touched the robot or the field during the run without the permission of the Juge.

## 6. Scoring

The robot scores points for completing each field task according to the Table 2.

Action	Points
Field 1 task completed	40
Field 2 task completed	80
Field 3 task completed	40
The robot pushed the skittles out of a ring on the Field 4	5 (for each of the 8 skittles)
Total maximum:	200

Half of the points will be awarded for the field task, if the robot completes the task from the second attempt. A quarter of points will be awarded for the field task, if the robot completes the task from the third attempt. No points are awarded for the field task starting from the fourth attempt.

In the case of multiple attempts, only the maximum score obtained for this field task is taken into account.

In case of failure to complete any field task, no points will be awarded for that task.

If an attempt is disqualified, no points will be awarded for the entire run.





The sum of the points that the robot scores for completing the field tasks and the time from the start to the end of the run are the final result.

In case of interruption of the run, the time of the attempt is equal to the maximum allotted time of the run as defined by the Contest Rules of the corresponding competition category.

The attempt with the highest score is counted. If the points are equal, an attempt with the minimum run time is counted.

## **7. Procedure for Determining the Winner**

The winner is the team with the highest score.

If the points are equal, the team with the minimum run time gets the advantage.