Robofest 2020 Game
GolfBowl

V 1.0 – International Kickoff Version for 2020 season. Each country may clarify/adapt/change rules for each country's qualifying competitions. World Championship rules will be finalized in Jan 2020.

This file can be found under the **Get Involved → Game** page on the website
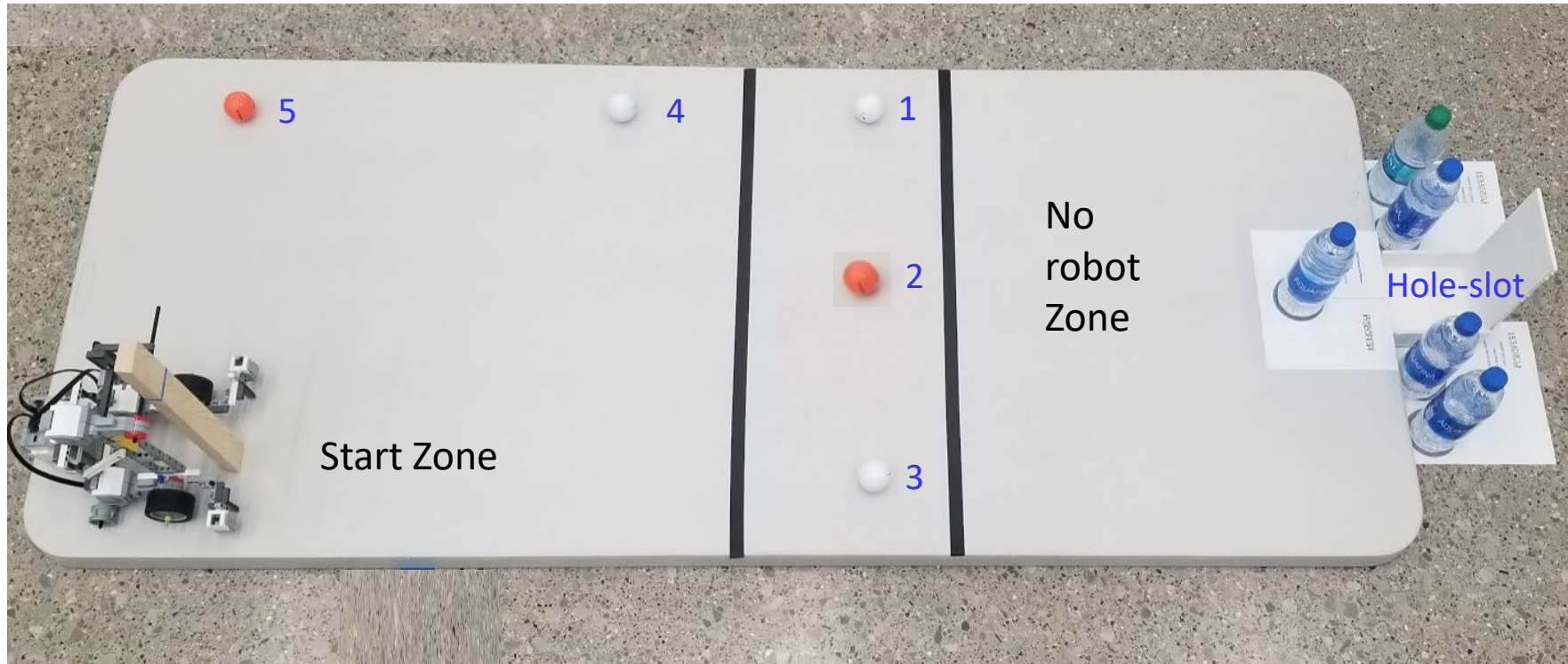**Coaches are responsible for communicating rules updates to contestants**

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1. Game Synopsis (1/2)

STEM Learning Goals
- Degrees
- Proportional logic
- Localization
- Navigation
- Computational thinking
- Physics
- Object detection (Sr.)

- Putt 5 golf balls with a wood piece attached to the robot into a Hole-slot. Alternative partial points will be given if the 4 bottles on the floor are knocked (bowled) over or moved. Penalty points are given if the bottle on the table is knocked over or moved.

- For a game, 2 minutes are given

1. Game Synopsis (2/2)

- White balls cannot be moved before putting. Orange balls may be moved by the robot before putting

- One full-reset of the playing field is allowed

- All the tasks must be done autonomously without any external help

- The robot may attempt/complete the putting in any order

- UTF (Unknown Task and Factors) will unveil the following just before the 30 minute work-time
  - The starting location and orientation of the robot
  - The locations of balls
  - How to end the game (new items on the table, landmarks, may be added)

2. Playing Field (6ft table) Setup
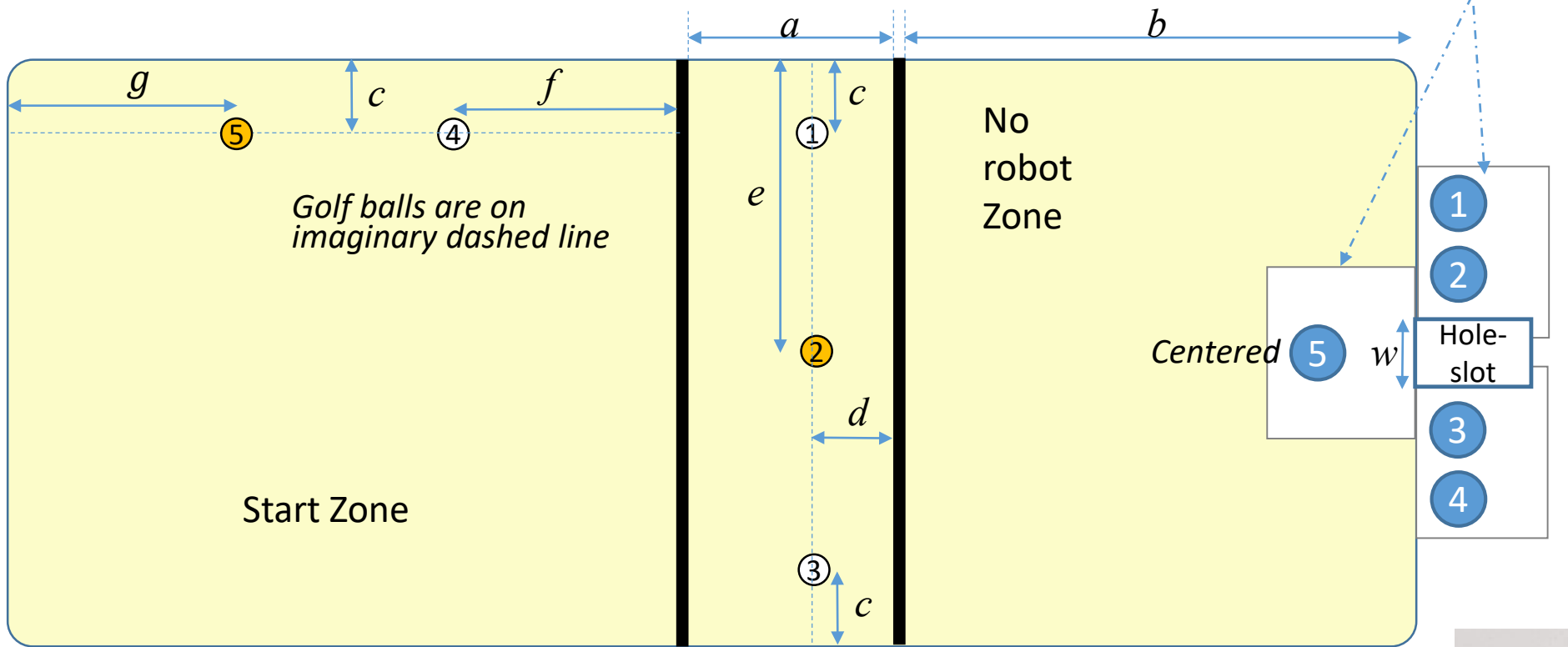
a	30cm (measure to the **edge** of tape)
b	**55**cm (measure to the **edge** of tape)
c	~~10cm~~ 13cm
d	Unveiled before 30 min worktime $3cm \leq d \leq 15cm$ (measure to the edge; both for Jr and Sr)
f	30cm
w	12cm (inner edge)

Bottle locator template paper

Golf balls are on imaginary dashed line

No robot Zone

Start Zone

Centered

Hole-slot

| e & g | Jr: Unveiled before 30 min worktime |
| | Sr: Completely unknown. Robots must detect it. |

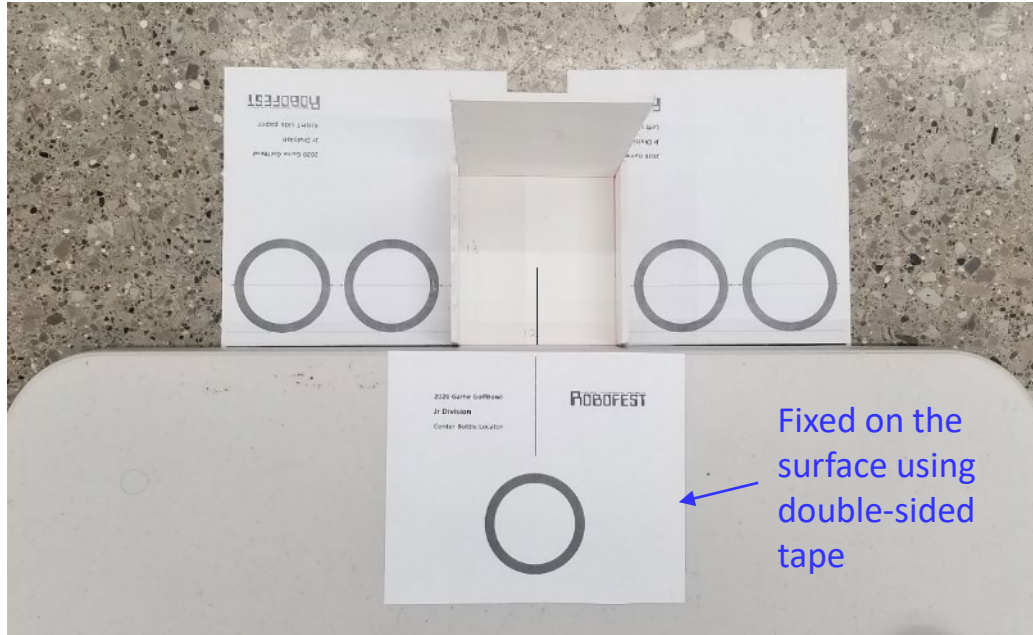$30cm \leq e \leq 45cm$ $20cm \leq g \leq 40cm$

d, e, g values will be different for each round.

hole reinforcement stickers are used to mark ball placement.
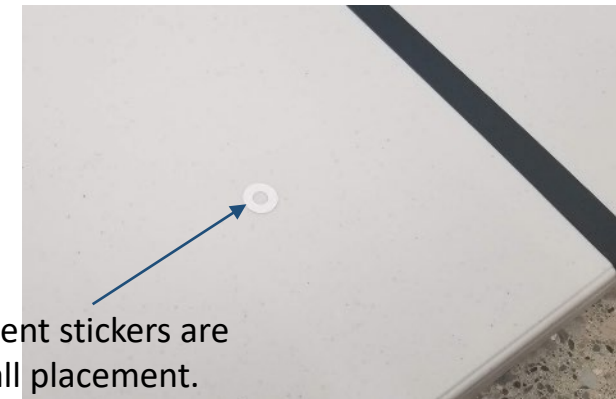
3. List of Materials/Properties of the Field

- 6ft plastic folding tables placed on the floor:
  - 30"x72" (actual size is about 75 x 182cm)
  - The recommended brand is "LifeTime". The 4 corners are rounded with a radius of 4cm ~ 7cm. Thickness is about 4.5cm. The surface is light in color such as white, gray, or almond; however, the exact size, color, brightness, and edge shape of the table is unknown until the competition day
  - Fold-In-Half plastic tables can be used if the center seam is covered with (masking) tape similar to the table color. The color of the tape would also be an unknown factor in that case
  - Pieces of plywood cut similarly to the folding tables can also be used if plastic folding tables are not available
- Floor color under tables: Unveiled at the beginning of competition day, possibly not homogeneous. However, all the colors should be noticeably darker than the table color
- Hole reinforcement stickers: Used to mark the location of golf balls (link)
- Golf Balls: Standard white golf balls (link) and orange golf balls (link)
- Water Bottles: 500ml (16.9 FL Oz) bottle. The height is about 20cm. Bottle diameter is approximately 7cm in diameter. Unveiled at the competition site. Details about weight can be found on slide 4
- Bottle locator template. See Game Page at: https://www.robofest.net/index.php/current-competitions/game
- Hole-slot: made of white foam board. For building instruction and template, visit Game page at: https://www.robofest.net/index.php/current-competitions/game
- Black electrical tape: width of the standard tape is ¾" or 1.9cm

4. How Bottles will be Prepared & Located

Fixed on the surface using double-sided tape

Exact locations of bottles is defined on the "bottle locator template" papers. Same for both Jr and Sr
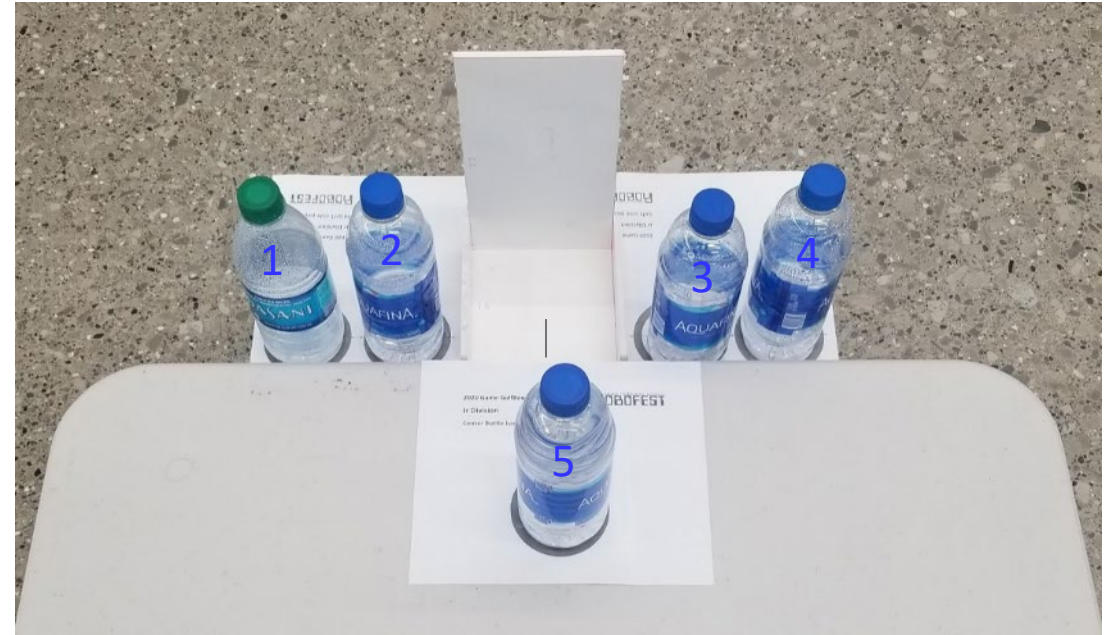
Initial Setup of bottles

Bottle Weight:
- #1, 2, 3, 4 Bottles: Partially full, 80 gram
- #5 full water bottle = around 524g (Actual bottles to be used is unveiled on the competition day.)

5. Violations and Full Reset

When any of the following violation occurs, Judges shall stop the game play immediately to avoid further disruption of the field:

- Human touch of the robot or playing field materials

- Robot falls off the table

- Robot invades the "No Robot Zone". Any part of the robot must not "touch" the "No Robot Zone" table surface. On the black line is OK

The team can request one-time full reset (with penalty points) at any time OR declare the end of the game. If reset is selected, time continues to run while Judges reset the table.

Note that the bottles moved or knocked (bowled) over by the above violations are not counted. Need to be reset.

If the ball went into the hole-slot by the above violations, it shall not be counted. Judges will remove it.

6. Invalid Putting

When the following Invalid Putting occurs and the ball goes into the hole-slot, Judges shall announce "Invalid" and ball remains in the slot and recorded on the scoring sheet

- Not by wooden putter, for example: push by body of the robot

- Putt after moving the white ball (White ball putted after being moved)

Note that Bottles moved or knocked over by the invalid putting are OK and counted as they are.

7. Procedure/Rules to Play 2 Rounds (1/2)

1. Only contestants are allowed to access the pit area, team tables, practice fields, and official game fields throughout the competition day, including during the setup time before the opening ceremony, during work time and breaks (adult coaches, mentors, or other volunteers may assist with transporting team materials only if necessary, escorted by proctors)

2. When Unknown Tasks and Factors (UTF) are unveiled, teams will be provided a hard-copy of the UTF or it will be projected on a screen. See 8.1 and 8.2 for UTF examples

3. Teams will be given a 30-minute work-time after UTFs are unveiled to work on their robots. Prior to the start of the work time, all people except contestants and authorized staff/volunteers will be **dismissed** from the room

4. During the practice time, teams must share the playing fields

5. All teams must submit their robot to the impound area when the 30 min work-time has expired. Robots may be taken to be impounded early. Only one team member should deliver the robot to the impound table. Penalty may be applied if not impounded in time

6. During the impounding process, judges will inspect the robots. (Size of the robot after expanding, Team ID, Team Name, label with "Front", number of computer controllers, etc.)

7. Procedure/Rules to Play 2 Rounds (2/2)

7. No power will be supplied at the impound table and the entire robot must be impounded, including rechargeable batteries

8. Teams will compete in a pre-determined order decided by the site host

9. During the Game Rounds, all team members must remain in the team spectator area – no pit access allowed

10. When a team is called to compete, a maximum of two contestants per team are allowed to retrieve the robot from the impound area and to be present at the playing field during the run

11. Judge (or Emcee) will check if (1) timer is ready (2) Judges' are ready, (3) teams are ready. Then count down 3-2-1 "Go" to start a Game

12. Contestants must stay near the Start Zone. They should not follow the robot. They can approach the robot only when they decide to pick it up or if the robot is in the Start Zone

13. Final scoring is done after the run is over. A team member must sign the score sheet to confirm the team's score. Displaying scores is highly recommended

8.1 UTF Example (Jr)

- The starting location and orientation of the robot: see the diagram

- How to end the game: Detect the No Robot Zone line and stop there. The robot must be stopped with a sensor positioned above the line. If the score is 100 or greater, then time left will be recorded.

- The locations of balls: See table below:

d	10cm (measure to the edge)
e	37cm
g	30cm
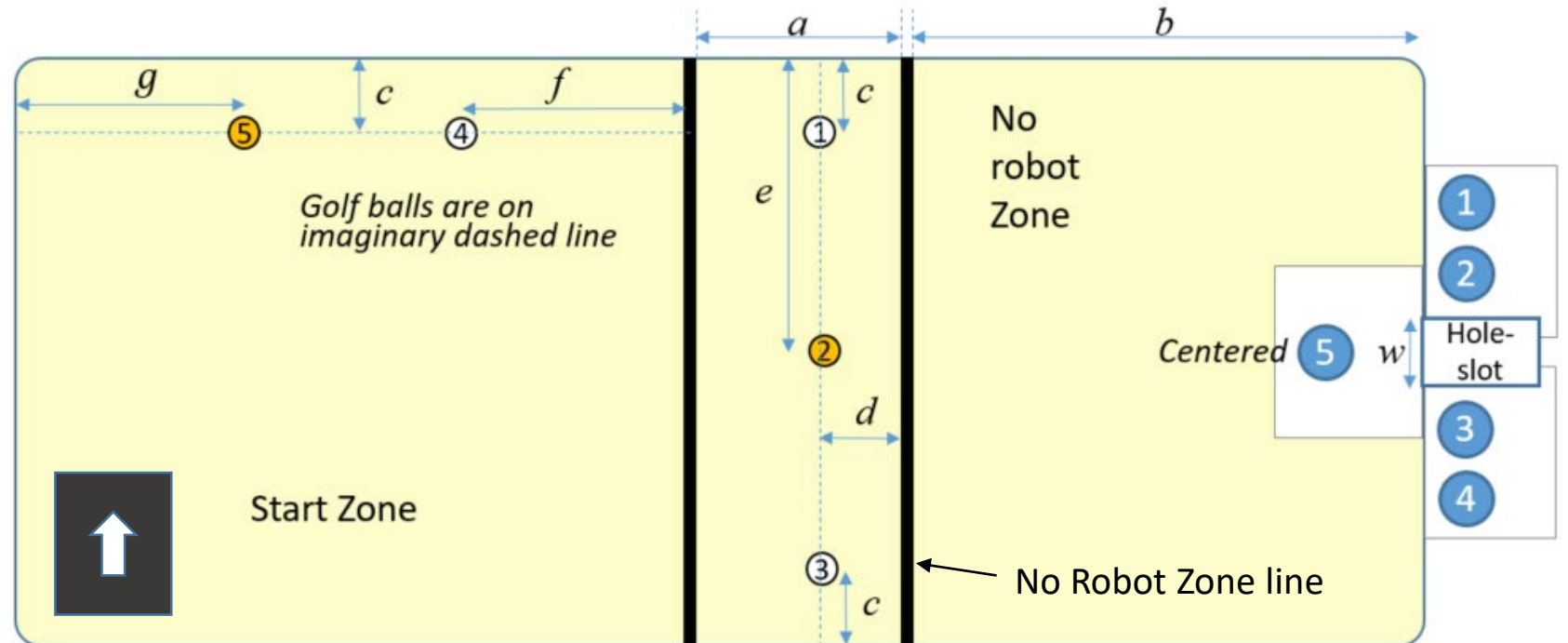
8.2 UTF Example (Sr)

- The starting location and orientation of the robot: see diagram below

- How to end the game: Detect the No Robot Zone line and stop there. The robot must be stopped with a sensor positioned above the line. If the score is 100 or greater, then time left will be recorded.
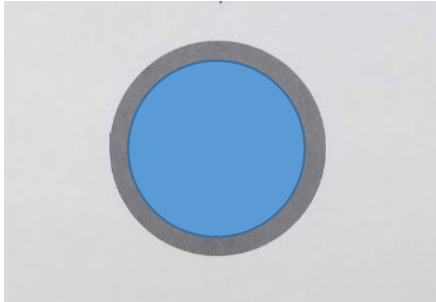
- The locations of balls: See table below

d	10cm (measure to the edge)
e	$30cm \leq e \leq 45cm$
g	$20cm \leq g \leq 40cm$
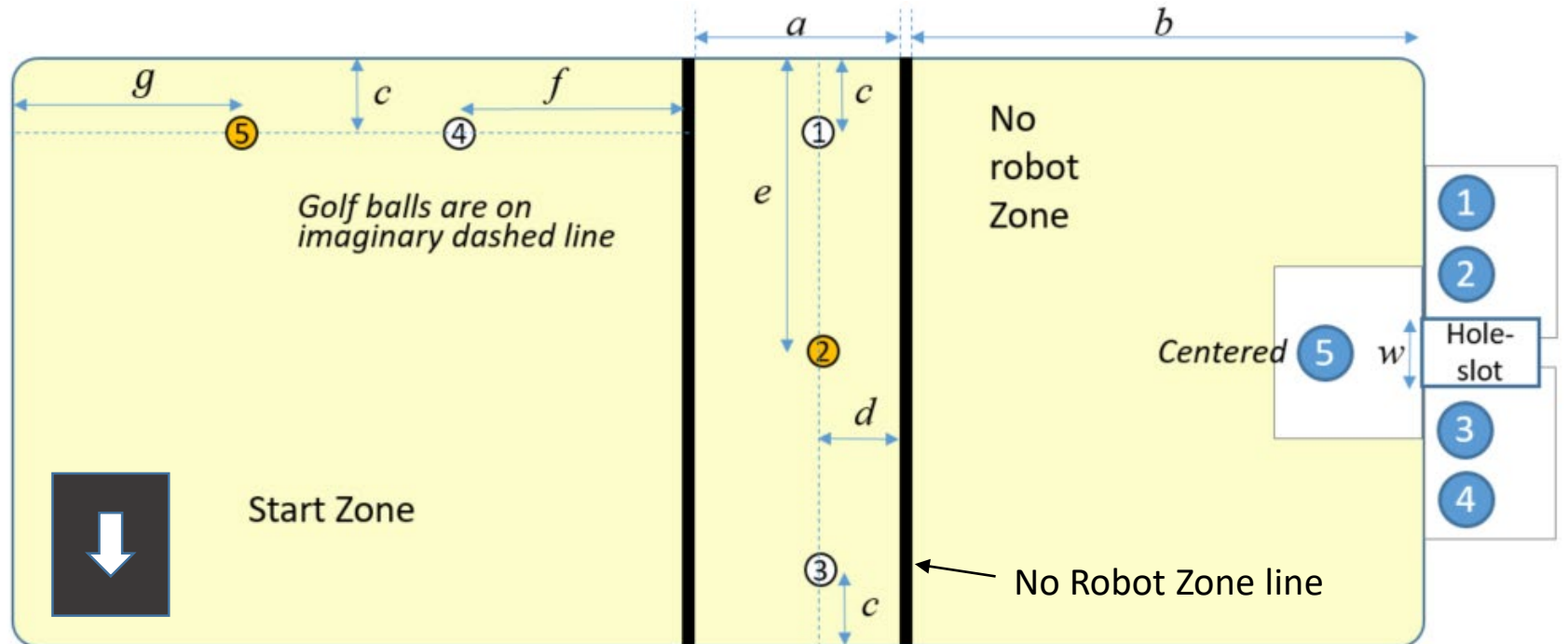
9. How to Score Bottles & Golf Balls

• Scoring Sheet can be found on Game Page at:
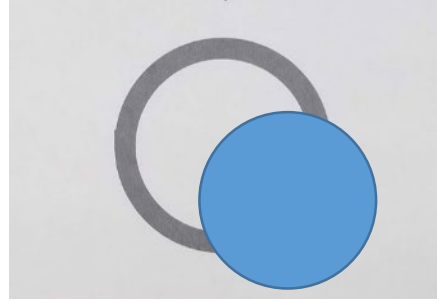 https://www.robofest.net/index.php/current-competitions/game

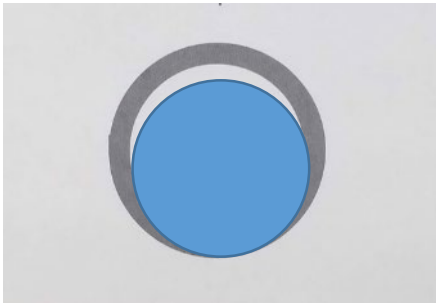# 10. Bottle Scoring Examples

Initial Bottle Position

Not Moved

Moved

Not Moved

Moved

Moved
(Bottle completely out of circle)

Blue circles here refer to the projection, not the bottom, of the bottle. **Lego blocks as a jig can be used to check. A photo will be added later.**

11. Robot Specifications

- Maximum size is 50 x 50 x 50 cm including expansion. There is no initial size requirement

- Weight limitation: none

- Any number of sensors/sensor types (unless it is harmful to humans)

- Any number/type of motors/servo motors (multiplexor is OK to use)

- Any material/robot kit may be used to construct your robot including tape, glue, bolts and nuts, rubber bands, etc.

- A Robofest Team ID and Name tag on top of the robot is required.

- A label identifying the "Front" side of the robot is required

- Must have a display screen for the game ending task

12. Wood Putter Specifications

- 1x2 un-painted wood piece

- Pine wood is recommended

- The dimension is shown on the right. The tolerance of the dimension is ±1mm. The wooden putter can be slightly modified (for example: drilled to make holes or sanded) as long as the dimensions are maintained

- The putter should be designed to hit the ball with wood part only

- Only one putter operated by one or more actuator(s) shall be used for a robot

28 cm

3.7 ~ 3.8 cm

1.8 ~ 1.9 cm

Tolerance: ±1mm
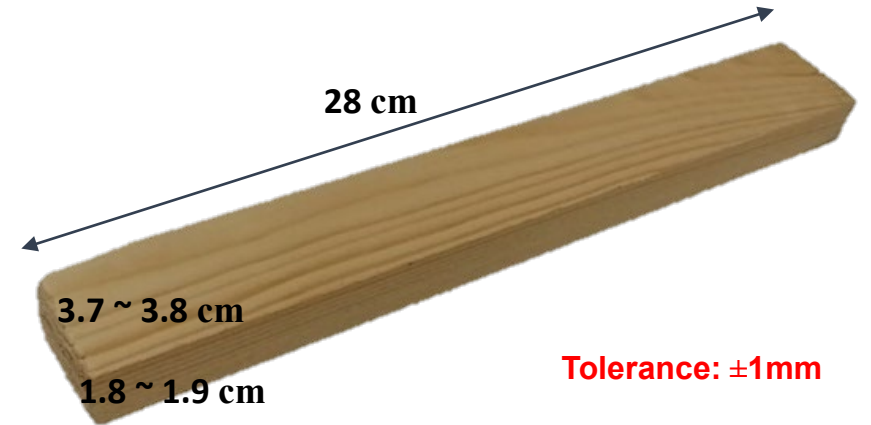
13. Differences between Junior and Senior age divisions

	Junior (5th ~ 8th grades)	Senior (9th ~ 12th grades)
Game-Ending-Mission	Easier	Harder
Location of orange golf balls	Unveiled before work-time	Completely unknown. Robots must detect orange golf balls
Number of on-board computer controllers	One	No limit

14. Rules to Determine Winners & Break Ties

- Winners in each age division will be decided by the **average** total score of the 2 rounds

- Tie breakers will be: (1) best score of two rounds, (2) highest time left from best score, (3) rerun, if needed

- For example:

Team Name	Round 1 score	R1 time left	Round 2 score	R2 time left	Avg. Score	(1) Best score	(2) Time left best score	Rank
Team A	80		100	15	90	100	15	1
Team B	100	10	80		90	100	10	2
Team C	90		90		90	90		3

15. Reminders of General Rules and Restrictions

- Proctors are watching for the following violations:
  - Coaches or parents in the pit area during practice or work-time (except for initial transport of materials)
  - Coaches or parents accessing the practice or official game tables at any time
  - Verbal/electronic communication between the team and coach/parent while the team is setting up and practicing in the pit area and during work-time
  - Team members leave the pit unsupervised during work time before their robot is impounded.
  - Any team member alters his/her own robot after impounding
  - Team handles or interferes with another team's computer or robot, either in the pit or in the impound area
  - Destruction of property
  - Use of inappropriate words and/or behavior toward team members, other teams, audience, judges or staff
- Any violations can result in deduction of points or disqualification at the judges' discretion
- If anyone sees any suspicious activities, please notify the nearest volunteer immediately
- Spectators are welcome to take pictures or video, but please make sure your flash is off

16. Important Notes

- Though every effort is made to be consistent and precise in all of the dimensions of the playing field and parts, Robofest assumes a tolerance of ±5 mm, unless stated otherwise

- If there are multiple playing fields at the competition sites, the Chief Game Judge will check consistency between the playing fields. However, there is no guarantee to make them all identical

- Judges & contestants should maintain at least 1 meter distance from the field when the robot is in action

- Final decisions are at the discretion of the Chief Game Judge

- Robofest 2019-2020 General Rules document at robofest.net

- Each team member, as well as the coach, must bring the signed Robofest Consent and Release Form on the day of the event, if not completed on-line

- Additional FAQs, Rule Clarifications, and/or Rule Change documents will be posted on the web at robofest.net

17. FAQs

- If a golf ball knocks down a bottle and goes in the hole-slot, can we can get more than 100 points? **Yes**

18. Template Files

The following template files are on the Game Page at:
https://www.robofest.net/index.php/current-competitions/game

- Ball locator template files (left, right, and center in letter size) in PDF

- How to make the Hole-slot (Template for 11'x17' paper)