ROBOFEST 2021 GAME

StackRolls

V 1.0 – **Final** Version for 2021 season

This file is posted on **Get Involved → Game** page
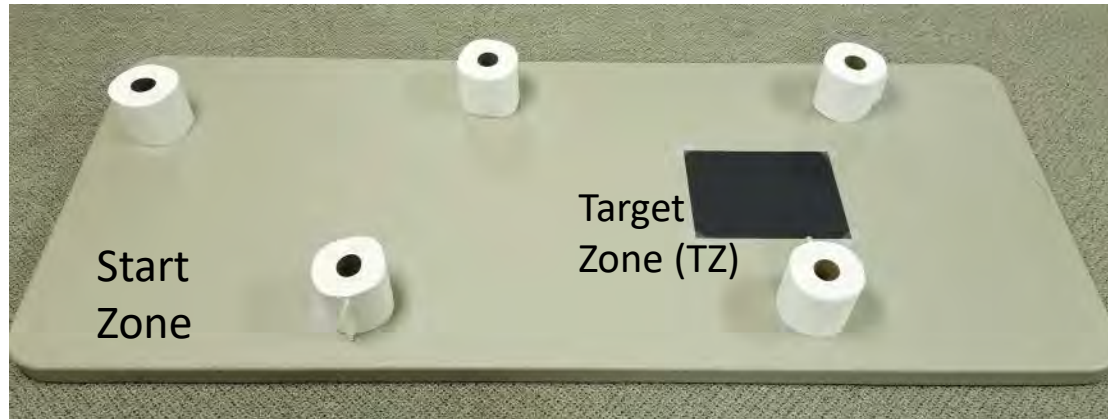Coaches are responsible for communicating rules updates to contestants

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1. Game Synopsis

Start Zone

Target Zone (TZ)

- Move toilet paper rolls to the Target Zone (TZ). Highest points will be given if all the rolls are arranged in a stable stack

- For a game round, max 2 minutes are given and one full-reset is allowed

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

- UTF (Unknown Task and Factors) will unveil the following just before the 30 minute work-time
  - The starting location and orientation of the robot
  - Some locations of rolls
  - New items/landmarks may be added on the table for the Game-Ending task

- STEM Learning Goals
  - Geometry/degrees/logic/Computational thinking
  - Localization and navigation
  - Object detection and manipulation

2.1 Example Scores (without Game-Ending task, etc.)
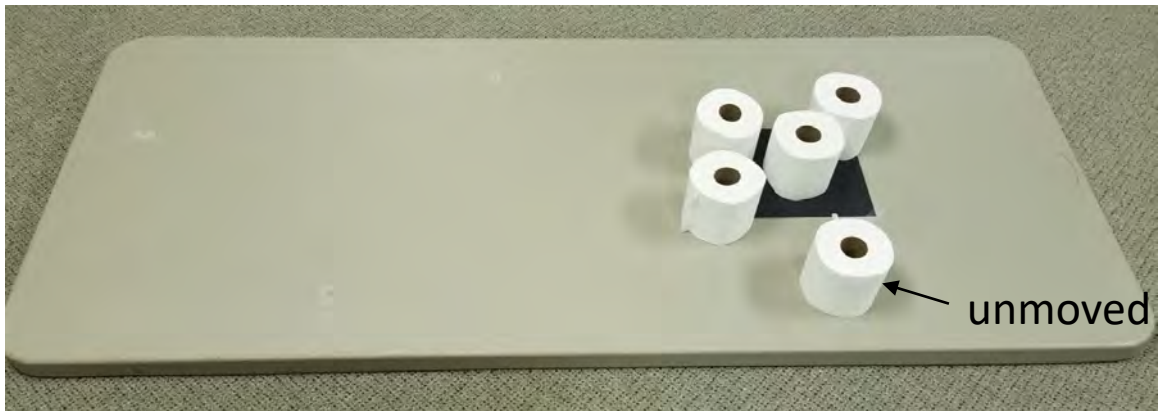
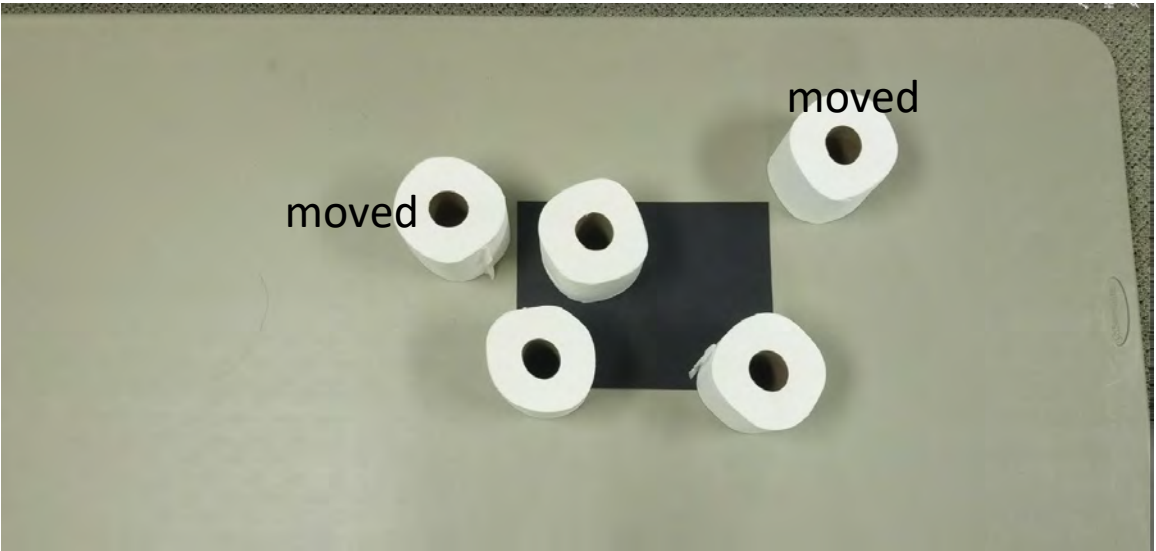Stacking Points (SP): 0
Location points (LP): 7+3x3=16
Total Score: 16

unmoved

Tallest stack	2nd tallest stack	Stacking Points (SP)
5	0	53
4	1 or 0	43
3	2	33
3	1 or 0	30
2	2	23
2	1 or 0	20

unmoved

"Partly in" based on *projected* profile
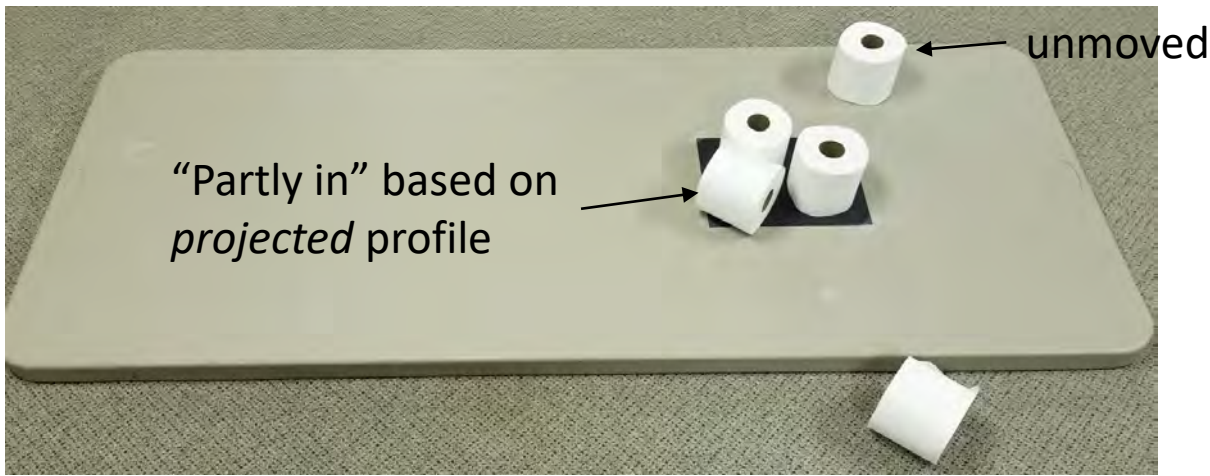
SP: 0
LP: 7x2+3+1=18
Total Score: 18

Location of a roll	Location Points (LP)
Completely inside the TZ	7
Partly in the TZ	3
Moved	1

2.2 Example Scores (without Game-Ending Task, etc.)

moved

moved

SP: 0
LP: 7+3x2+1x2=15
Total Score: 15

Tallest stack	2nd tallest stack	Stacking Points (SP)
5	0	53
4	1 or 0	43
3	2	33
3	1 or 0	30
2	2	23
2	1 or 0	20

unmoved
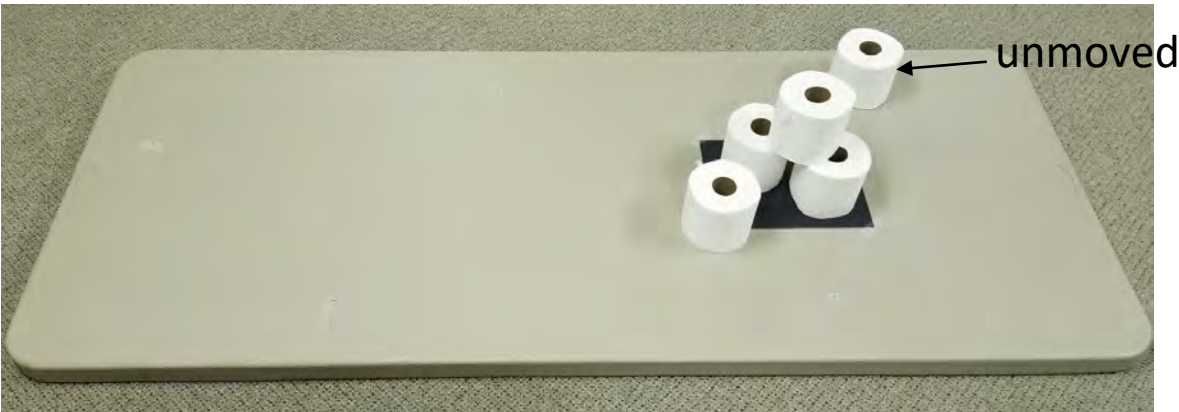
SP: 20
LP: 7x3+3=24
Total Score: 44

Location of a roll	Location Points (LP)
Completely inside the TZ	7
Partly in the TZ	3
Moved	1

2.3 Example Scores (without Game Ending Task, etc.)

unmoved
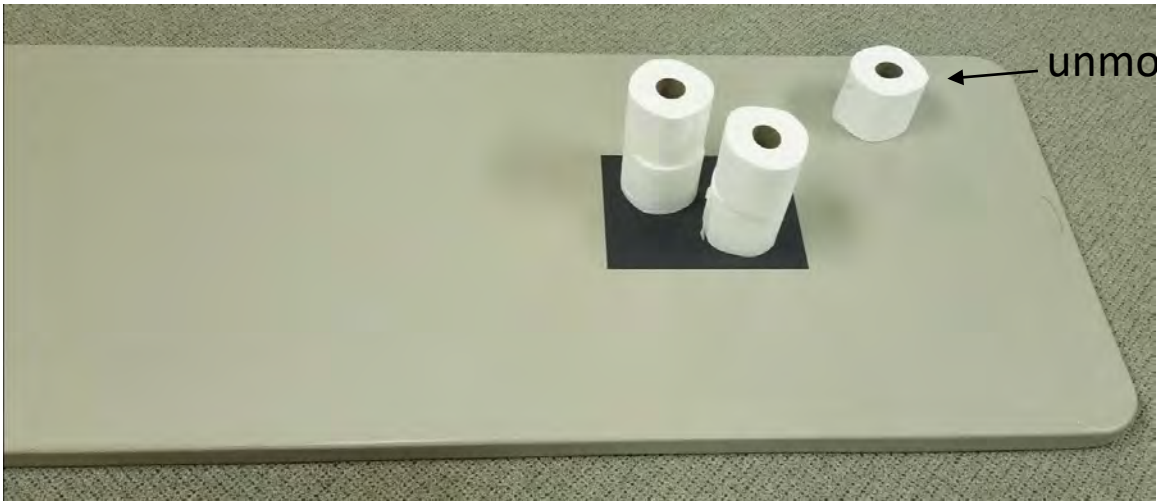
SP: 23
LP: 7x4=28
Total Score: 51
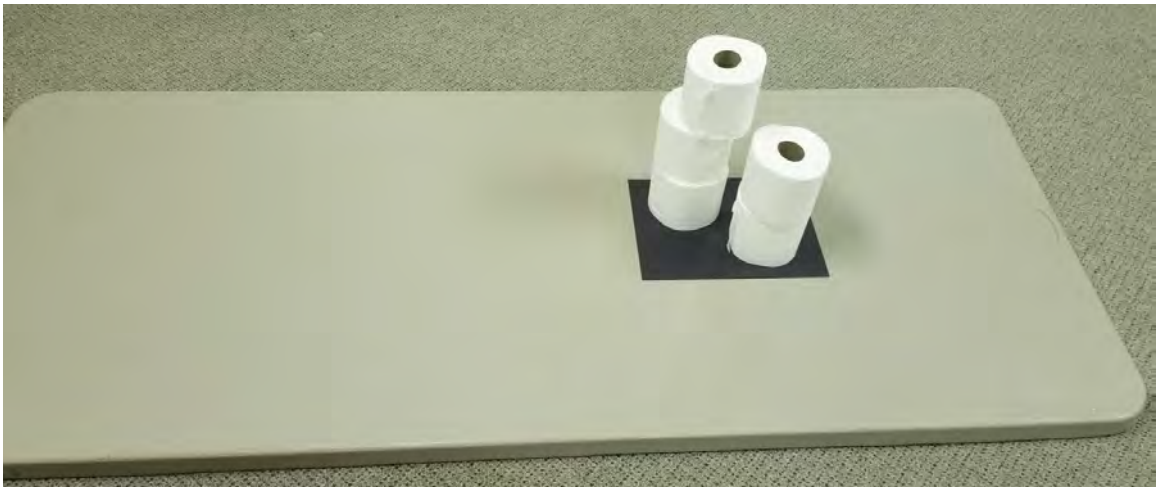
SP: 33
LP: 7x5=35
Total Score: 68

Tallest stack	2nd tallest stack	Stacking Points (SP)
5	0	53
4	1 or 0	43
3	2	33
3	1 or 0	30
2	2	23
2	1 or 0	20

Location of a roll	Location Points (LP)
Completely inside the TZ	7
Partly in the TZ	3
Moved	1

2.4 Example Scores (without Game Ending Task, etc.)
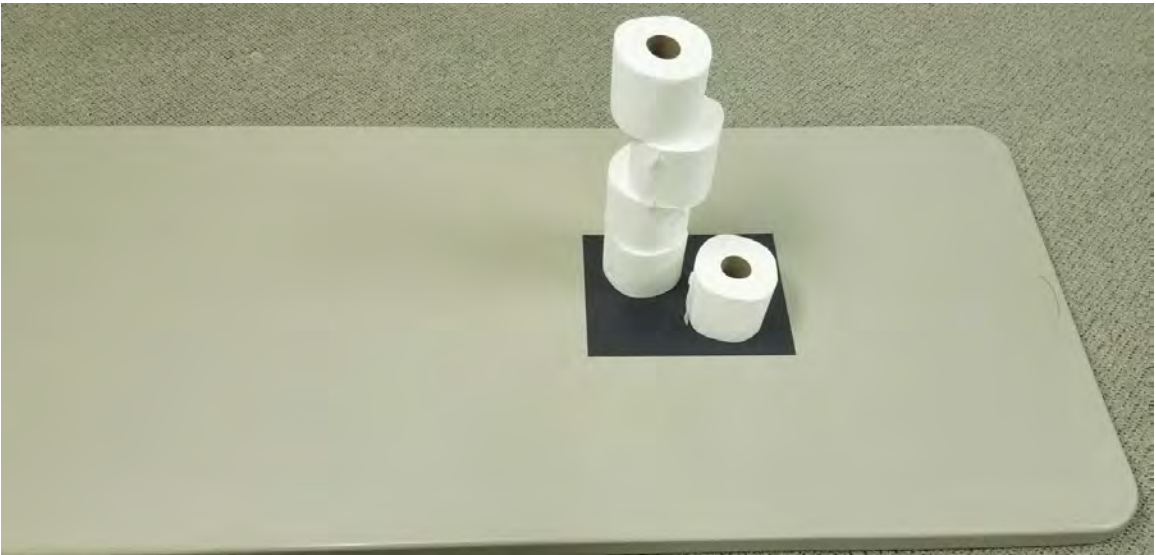

SP: 43
LP: 7x5=35
Total Score: 78

Tallest stack	2nd tallest stack	Stacking Points (SP)
5	0	53
4	1 or 0	43
3	2	33
3	1 or 0	30
2	2	23
2	1 or 0	20
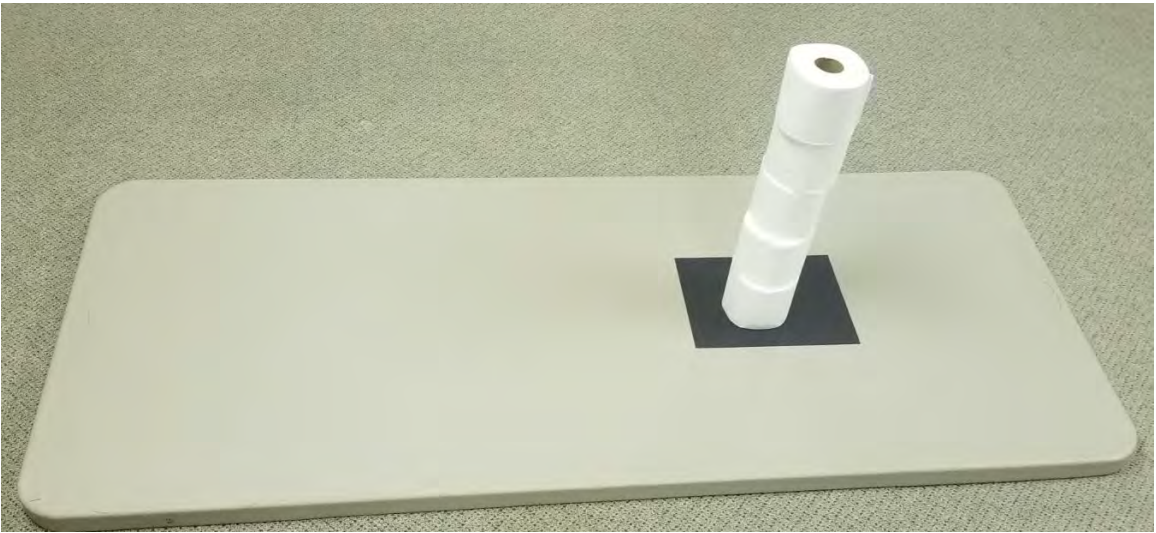
SP: 53
LP: 7x5=35
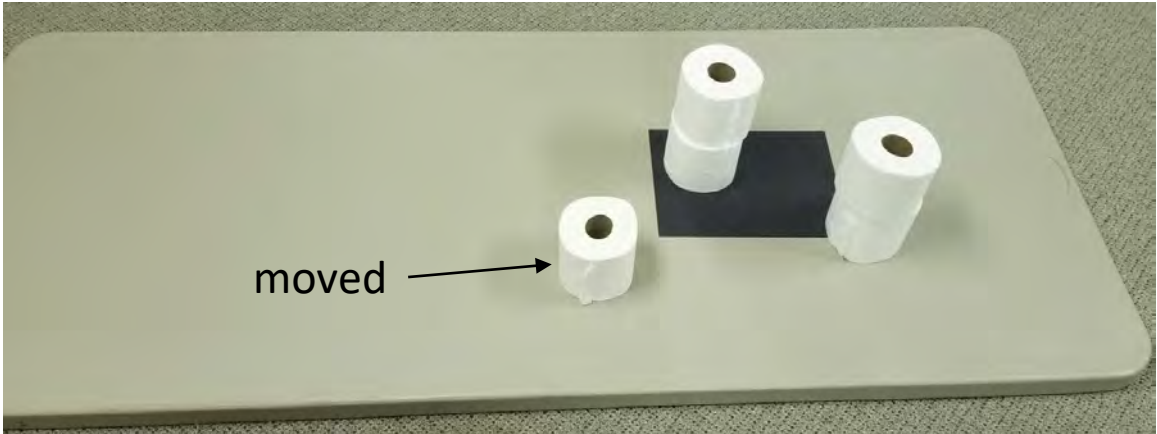Total Score: 88

Location of a roll	Location Points (LP)
Completely inside the TZ	7
Partly in the TZ	3
Moved	1

2.5 Example Scores (without Game Ending Task, etc.)

moved

SP: 23
LP: 7x2+3x2+1=21
Total Score: 44

Tallest stack	2nd tallest stack	Stacking Points (SP)
5	0	53
4	1 or 0	43
3	2	33
3	1 or 0	30
2	2	23
2	1 or 0	20

Unmoved base
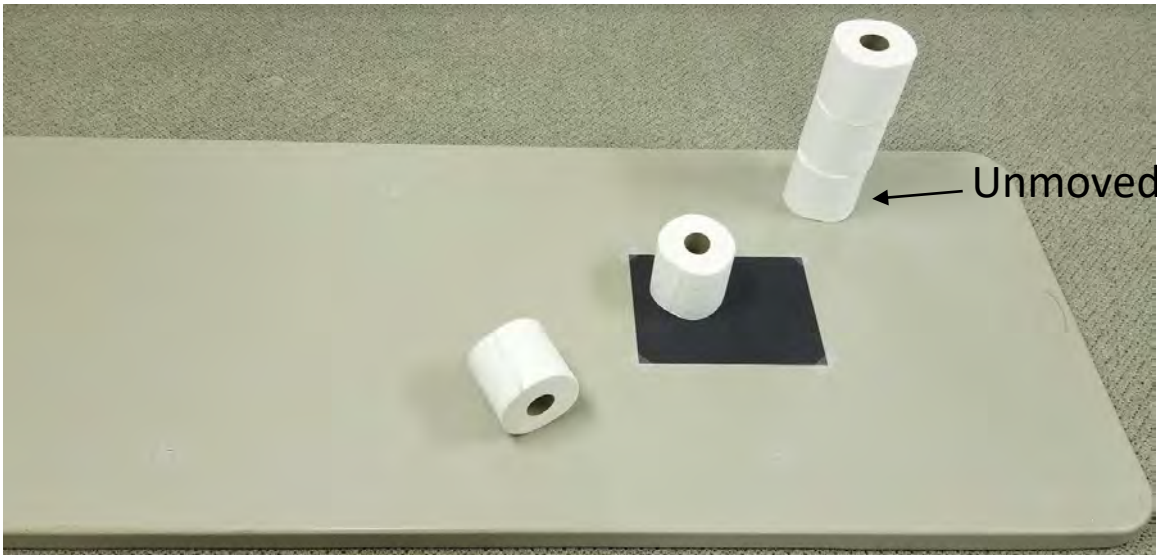
SP: 30
LP: 7+1x3=10
T Score: 40

Location of a roll	Location Points (LP)
Completely inside the TZ	7
Partly in the TZ	3
Moved	1

2.6 Demo Videos

- https://youtu.be/ZpRWPpyIj2w
- https://youtu.be/qLG-A1oz9Rc
- https://youtu.be/6UBLzD5rF8k

2021 Game Rules

3. Differences between Jr and Sr age divisions

	Junior (5th ~ 8th grades)	Senior (9th ~ 12th grades)
Game-Ending task	Easier	Harder
Location of initial toilet paper rolls	Three (Rolls #1, #2, #3) are specified in the rules. Two (#4, #5) are unveiled before the work-time	Two (Rolls #1, #2) are specified in the rules. Three (#3, #4, #5) are unknown. Judges will set after impounding.
Location of the target zone (TZ)	Fixed. Specified in the rules	
Number of toilet paper rolls	5	
Number of on-board computer controllers	One	No limit
Vision sensor	Not allowed	Allowed

2021 Game Rules

4. Playing Field (6ft table) Setup
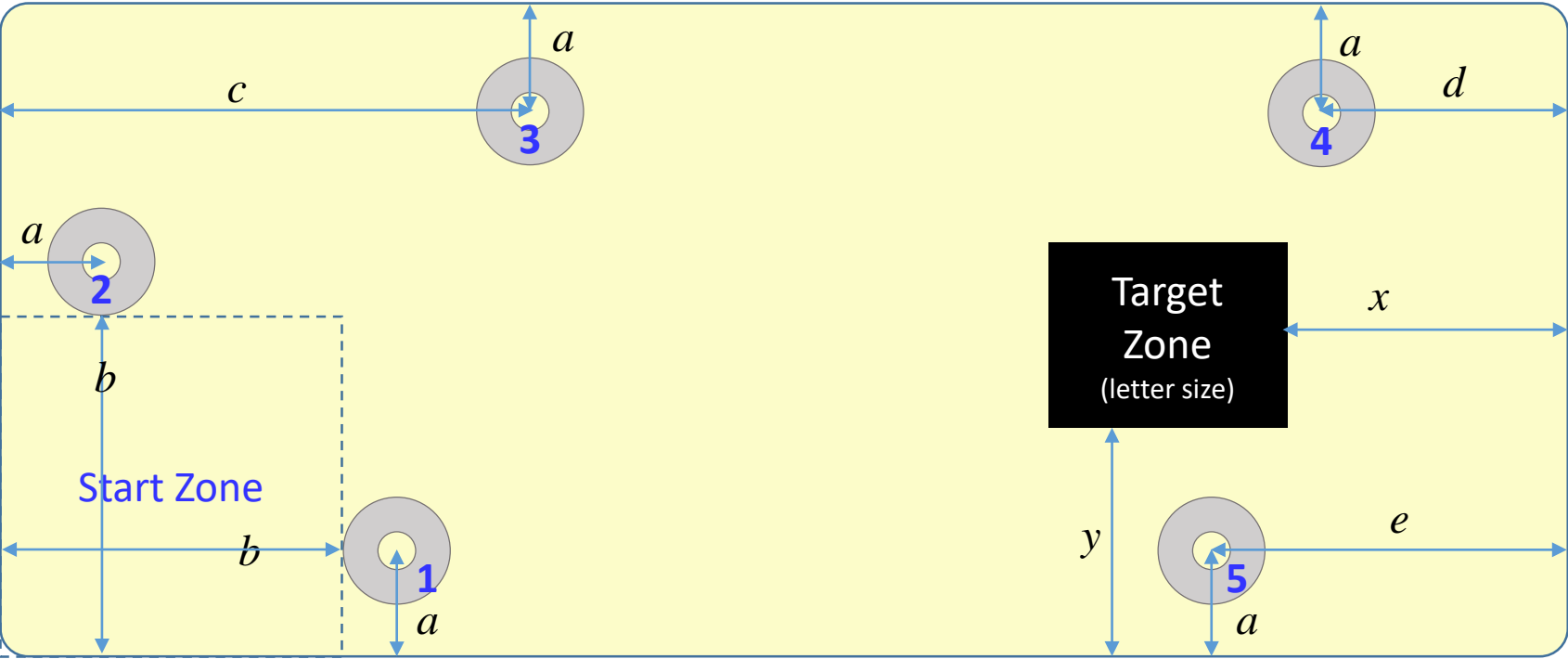
a	12 cm (measure to the center of roll)
b	50 cm (measure to the edge of roll)
c	Jr: 75 cm Sr: ? cm, $40 \leq c \leq 100$ (measure to the center of roll)
d	? cm, $12 \leq d \leq 62$ (measure to the center of roll)
e	? cm, $12 \leq e \leq 100$ (measure to the center of roll)
x	40 cm
y	27 cm

Hole reinforcement stickers are used to mark the location of rolls

- Jr: Locations of roll 4 and 5 (values d and e) will be announced before the work-time
- Sr: Locations of roll 3, 4, and 5 (values c, d, and e) will be unveiled after impounding

5. 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. Other thickness may impact scoring
  - 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 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

- Toilet paper rolls (unwrapped) such as Scott 1000
  - May not be perfectly round. The end edge of the roll paper may be glued. Due to damages, spare rolls must be prepared
  - In case of in-person competition: the actual rolls for games will be accessible when teams check in
  - Height: 9.6m ~ 11.5cm
  - Outer Diameter: 11cm ~ 13cm; Diameter of cardboard core: 3.8 cm ~ 4.5cm
  - Weight: 150 g ~ 212 g

- Black paper: 8.5" x 11" letter size (21.6 cm x 27.9 cm), weight less than 65lb (17 gm^2) Cover Stock. All the edges of the paper are scotch-taped to the table

- Hole reinforcement stickers: Used to mark the location of rolls (link)

6. Violations, Full-Reset, End of Game Declaration

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

- Human touch of the robot or playing field materials. Once the robot starts moving, the player cannot touch it

- Robot falls off the table (Any part of the robot touches the floor)

- Any other illegal activities that Judges determine

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

If the robot still moving when team calls "end of run" (or at the time limit) then no points will be awarded for the end of task which will require stopping.

7. Procedure/Rules to Play 2 Rounds (1/2) for in-person competition

1) Only contestants are allowed to access the pit area, team tables, practice fields, and official game fields throughout the competition, including during the setup time before the opening ceremony, during work time and breaks

2) When Unknown Tasks and Factors (UTF) are unveiled, teams will be provided a hard-copy of the UTF or it will be projected/displayed on a screen. See 9.1 and 9.2 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 competition area(s)

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 & Name, "Front" label, number of computer controllers, etc.)

# 7. Procedure/Rules to Play 2 Rounds (2/2) for in-person competition

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

8. Robot Specifications

- Maximum size: 50 x 50 cm *including expansion*. There is no initial size requirement. Note that a 50x50cm robot may hit the roll #1 and #2 if it tries to spin

- All the wheels for driving must touch the table surface

- Height limitation: none

- 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" end of the robot is required

- Must have a display screen for the Game-Ending task that may require to display numbers

9.1 UTF Example (Jr)
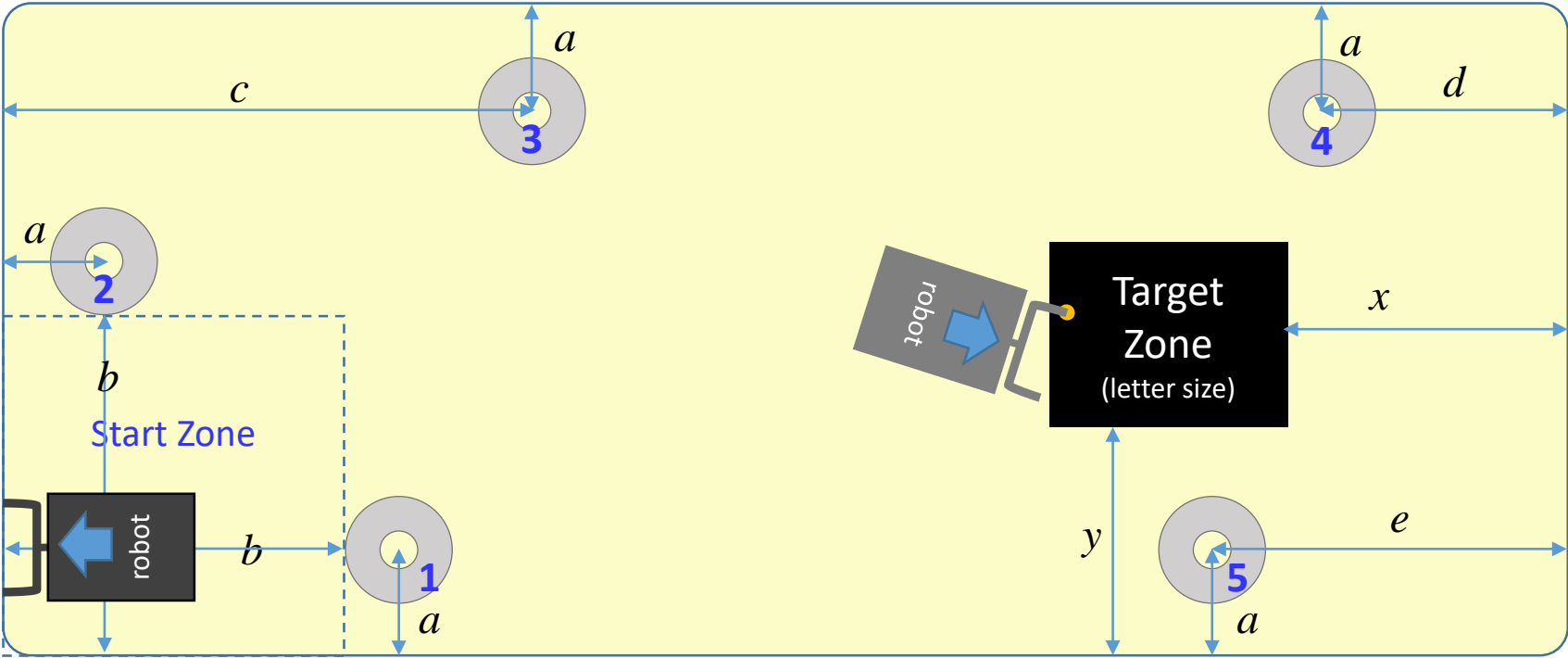
a	12 cm (measure to the center of roll)	
b	50 cm (measure to the edge of roll)	
c	75 cm (measure to the center of roll)	
d	**35 cm** (measure to the center of roll)	
e	**50 cm** (measure to the center of roll)	
x	40 cm	
y	27 cm	

- The starting location, orientation of the robot: in the Start Zone facing west edge. See the diagram above
- Roll #4 and #5 location: see the values *d* and *e* in the table upper right
- Game-Ending task: Detect the Target Zone and stop there. The robot must be stopped with a sensor positioned on the Zone (see the robot in light gray color)

9.2 UTF Example (Sr)
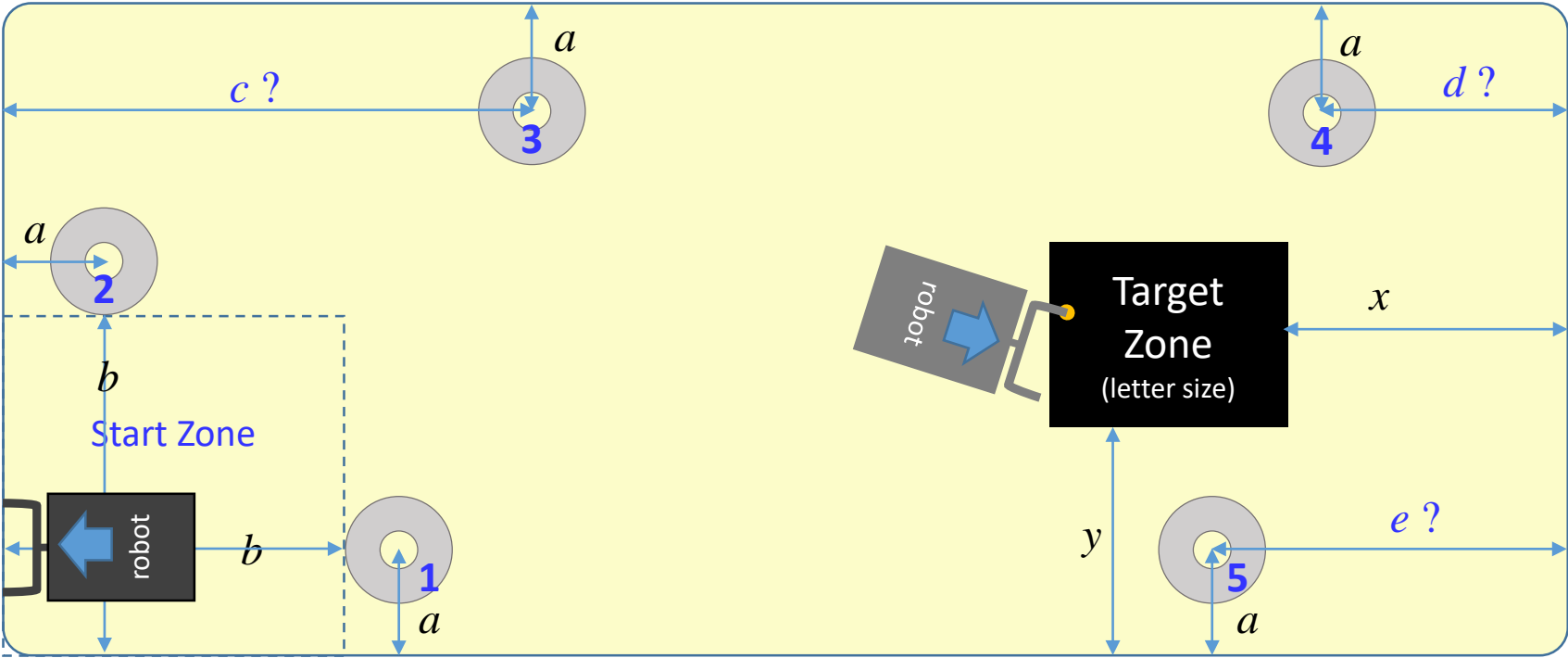
a	12 cm (measure to the center of roll)
b	50 cm (measure to the edge of roll)
c	**? cm** - unveiled after impounding $40 \leq c \leq 100$ (measure to the center of roll)
d	**? cm** - unveiled after impounding $12 \leq d \leq 62$ (measure to the center of roll)
e	**? cm** - unveiled after impounding $12 \leq e \leq 100$ (measure to the center of roll)
x	40 cm
y	27 cm

- The starting location, orientation of the robot: in the Start Zone facing west edge. See the diagram above
- Location of Roll #3, #4 and #5 will be unveiled after impounding
- Game-Ending task: Detect the Target Zone and stop there. The robot must be stopped with a sensor positioned on the Zone (see the robot in light gray color)

10. Scoring Sheet (1/2)

Scoring Sheet file can be found at: https://www.robofest.net/index.php/current-competitions/game

Judging Items (to be checked when the 2-minute Game Run is ended)				Point Value	Score Earned / Lost
Stacking Points (SP) - Height of the tallest stack	5			53	
	4	Height of 2nd tallest can be 1+ or 0++		43	
	3	Height of 2nd tallest stack	2	33	
			1+ or 0++	30	
	2	Height of 2nd tallest stack	2	23	
			1+ or 0++	20	

10. Scoring Sheet (2/2)

Location Points (LP)	Number of rolls completely inside the Target Zone	x 7 =	
	Number of rolls partly inside Target Zone	x 3 =	
	Number of rolls moved from the original location*	x 1 =	
The robot remained intact throughout the run. No part was dropped on the table.		2	
A full-reset was done (full-reset penalty) **		**-3**	
Game-Ending task is achieved		10	

(*) See examples of move in the rules.	**Total Score**		Max. 100+
(**) When a violation occurs, the team can either stop the game or request a full-reset & rerun. When 2ⁿᵈ violation occurs, the game is terminated. Grab the robot immediately! Note: partial reset is not allowed.	If **Total Score** is **100+**, record time in seconds	*Time Left*	
(⁺) Including unmoved		*Elapsed*	
(⁺⁺) off-table, sideway, or odd stack case			

11. How to determine a roll is in or partially in TZ?

In

Partly in
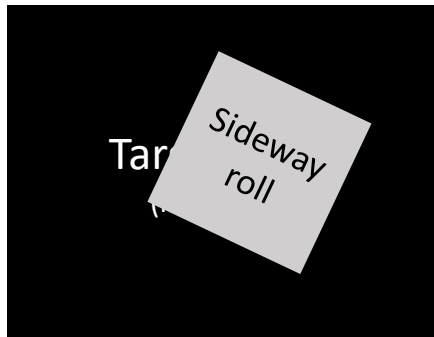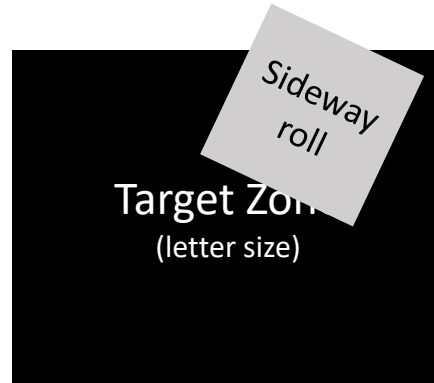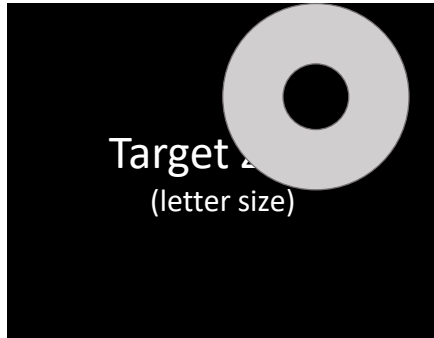
Both Partly In

Projection

Not Partly in

touching
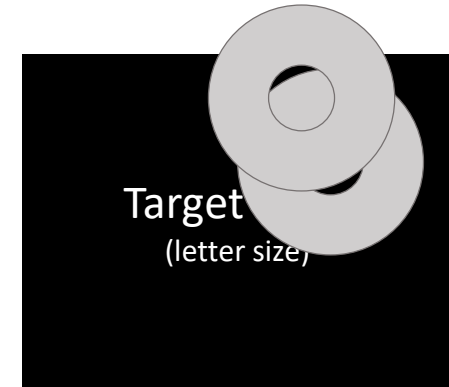
Both In

Based on the base roll

12. How to determine a roll is moved (for 1 point)
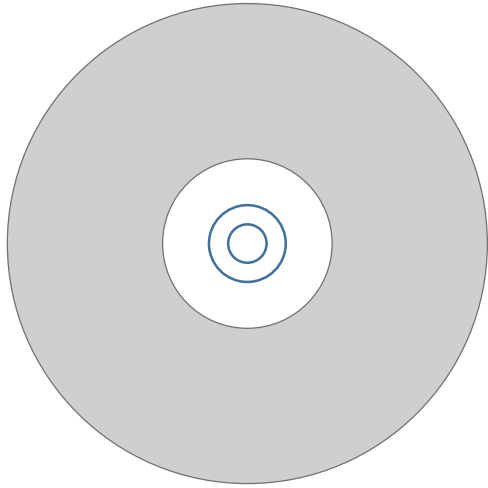
Not moved, if the sticker is centered
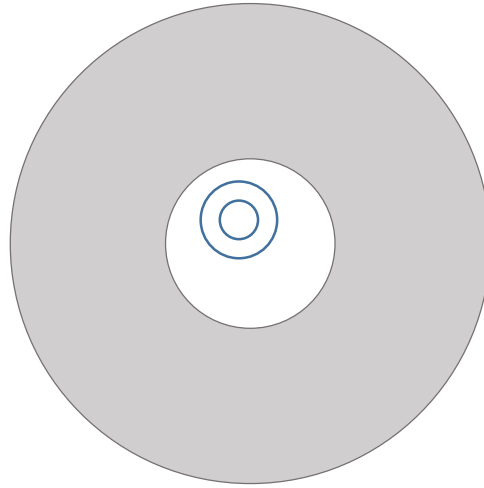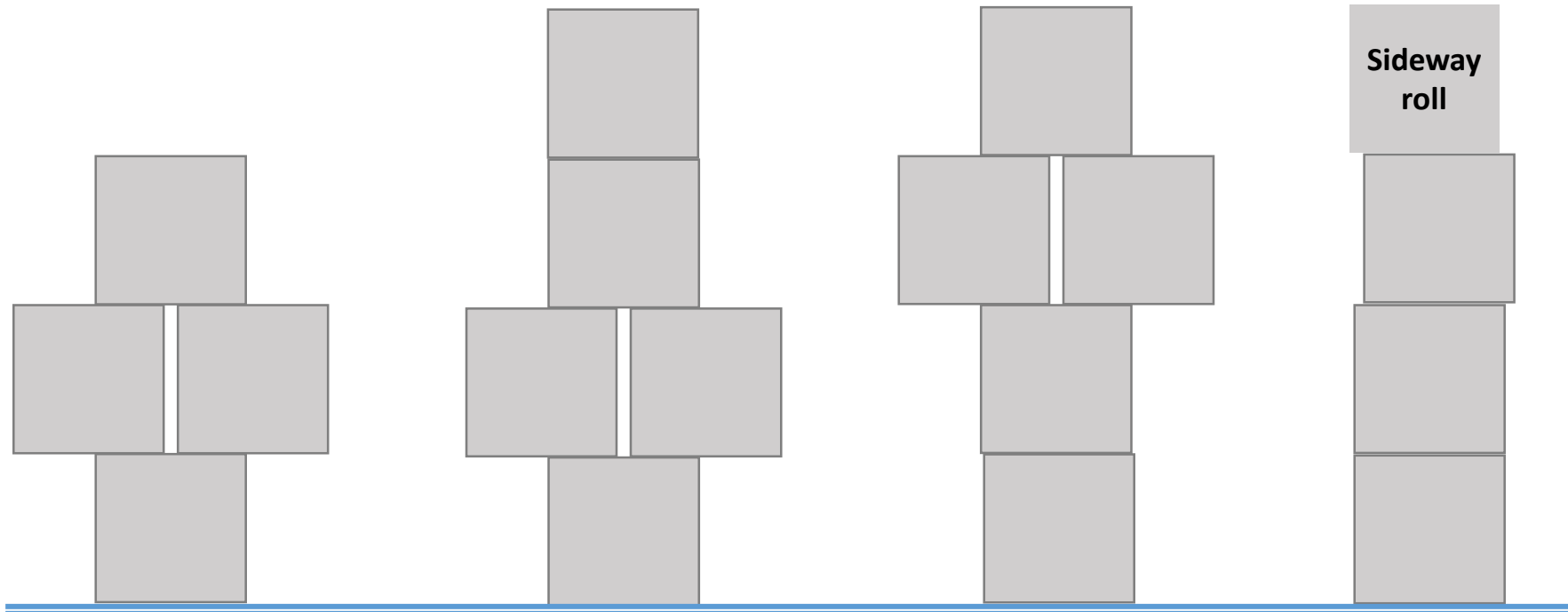
Not Moved, if the whole sticker is shown
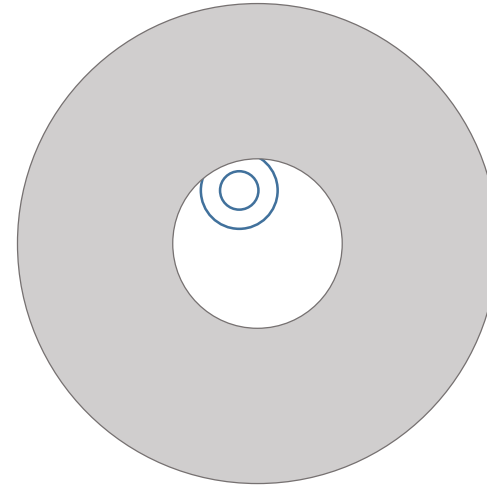
Moved, if the sticker is partially covered

Moved, if the sticker is covered

13. How to score Odd stacks

SP=30
Stack is 3 rolls high and 2nd stack can only be 1 since this has 4 rolls

SP=43
Stack is 4 rolls high

SP=43
Stack is 4 rolls high

SP=43
Stack is 4 rolls high

Tallest stack	2nd tallest stack	Stacking Points (SP)
5	0	53
4	1 or 0	43
3	2	33
3	1 or 0	30
2	2	23
2	1 or 0	20

14. Rules to Determine Winners & Break Ties

- Winners in each age division will be decided by the **average** 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. 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 in-person 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 m distance from the field when the robot is in action

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

- Additional FAQs, Rule Clarifications, and Rule Change documents will be posted at robofest.net

- Robofest 2021 General Rules document can be accessed on the 2021 Main Page 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

- Age Divisions: Junior (5th-8th) and Senior (9th-12th)

- Team Size: Max. 5

- Registration Fee varies by format – See General Rules

17.1. Online Competition Format Rules

- Team ID sign needed – Coach must print from "File Operations" menu on Coach Home Page
- Teams must use common Online camera set up
- Need to check playing field setup before the official runs
- Each location must have location judges to proctor & prevent unauthorized activities. See next slides
- Translators are allowed where needed

Preferred Camera View

17.2 Online Competition Format
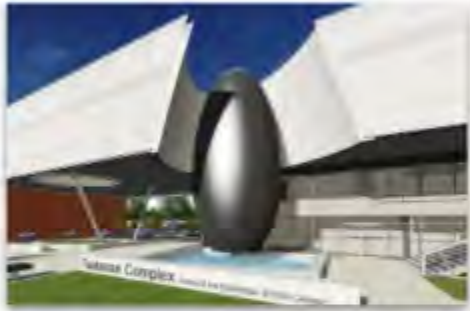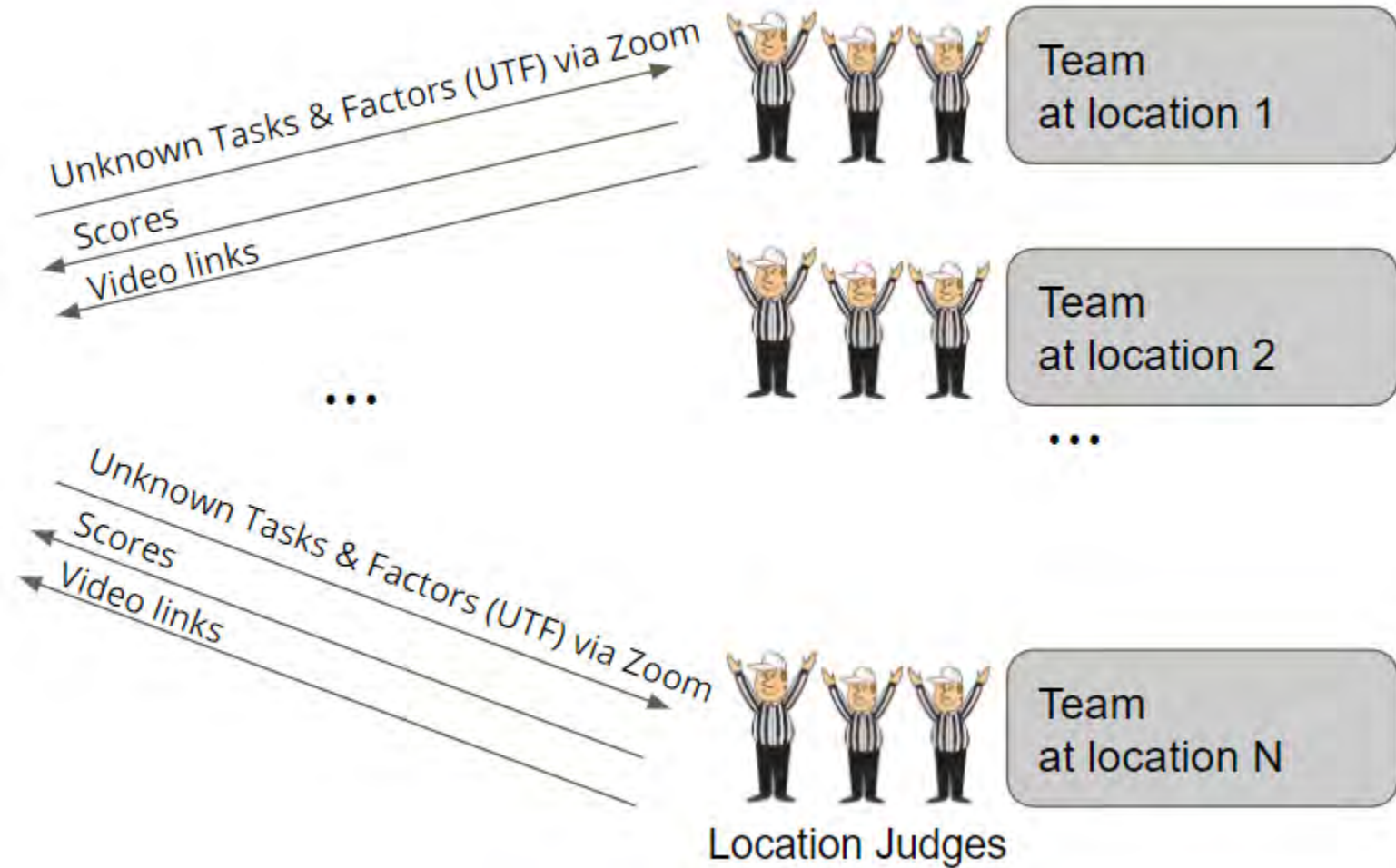
17.3 Online Competition – Location Setup

Coach

(Parents are encouraged to leave the location. They can join webinar as spectators or watch livestream on Facebook Live outside the location)

Team Table

Playing Field

zoom **Camera**
Landscape

Two devices with microphone & camera

zoom
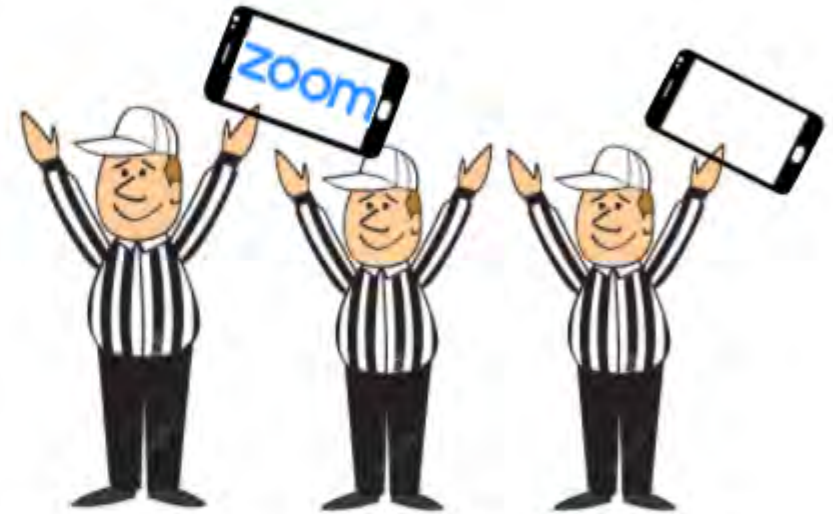
Location Head Judge (LHJ)

Location Judge 1

Location Judge 2 - Video recording

2021 Game Rules

2/6/21

18.1 Online Location Judges – Qualification & Roles

- Location Judges (LJ) must complete and sign the Pre-Event Checklist, show it during check-in and submit with the official scores
- LJ must sign a pledge document and recite the pledge during the opening ceremony
- LJ needs to be a person who does not have any direct relation to the team and approved by the National Director
- LJ must attend Online training

18.2 Online Location Judges Qualification & Roles

- LJs are to proctor & prevent unauthorized activities
- LJ will score each round and submit the official scores
- LJs are responsible for capturing a video of each run for score verification, uploading it to a video sharing platform and sending the link to Robofest
- The video must show our identifiable screen & sound in the beginning & the end for us to verify whether the video was taken during the official time
- The videos must be uploaded and links must be sent within 1 hour of the end of the competition

19. Online Pre-Event Checklist Example:

Official forms can be accessed at Game Page

20. Online Event Timing

- All teams will start simultaneously

- Site Host is the official timer
  - Local judges will use the Robofest start signal via Online connection
  - Local judge will enter an estimated time on the scoresheet
  - Official times will be determined by the Site Host after the event

- No reruns

- Judge should not instruct team to pick up robot until either
  - Robot has fallen off the table
  - End of the run (as determined by the team or the timer)

- Robofest reserves the right to make judgements and score adjustments after review of team submissions

21. FAQs

- What if rolls are on the robot when the game ends?
  - **The whole robot is in the TZ: Considered as just moved.**
  - **The robot is NOT in the TZ: Considered as just moved.**

- Push rolls by another roll? **Yes**

- A player failed in starting the robot. Can the player retouch the robot to start? **Yes**

- Robot is touching or holding roll(s) at the end of game. Is this OK? **Yes**

- Do the rolls need to be unwrapped? **Yes** – Rolls can be wrapped for practice, but must be unwrapped for official competition. Teams should have extra rolls on hand to replace any damaged rolls