

2012 NRC

Regular Category

Lower Secondary School

Game description, rules, scoring, & scenarios.

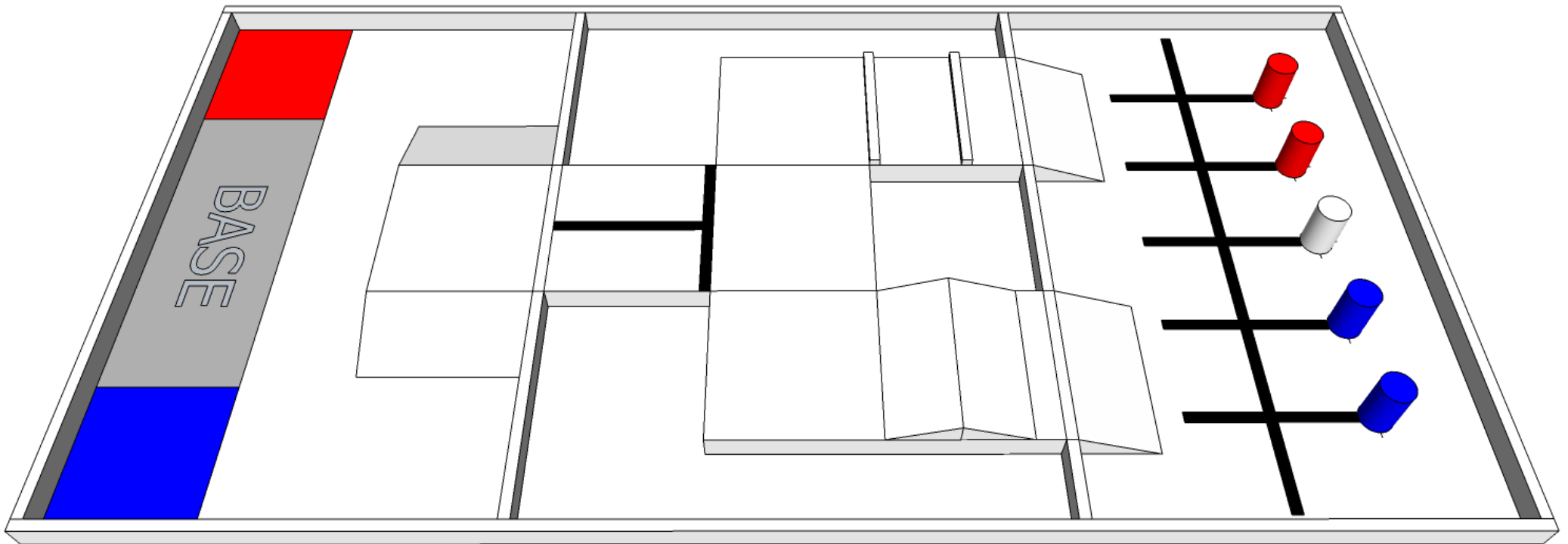
ROBOT COLUMBUS

(FINAL COMPETITION)

Index

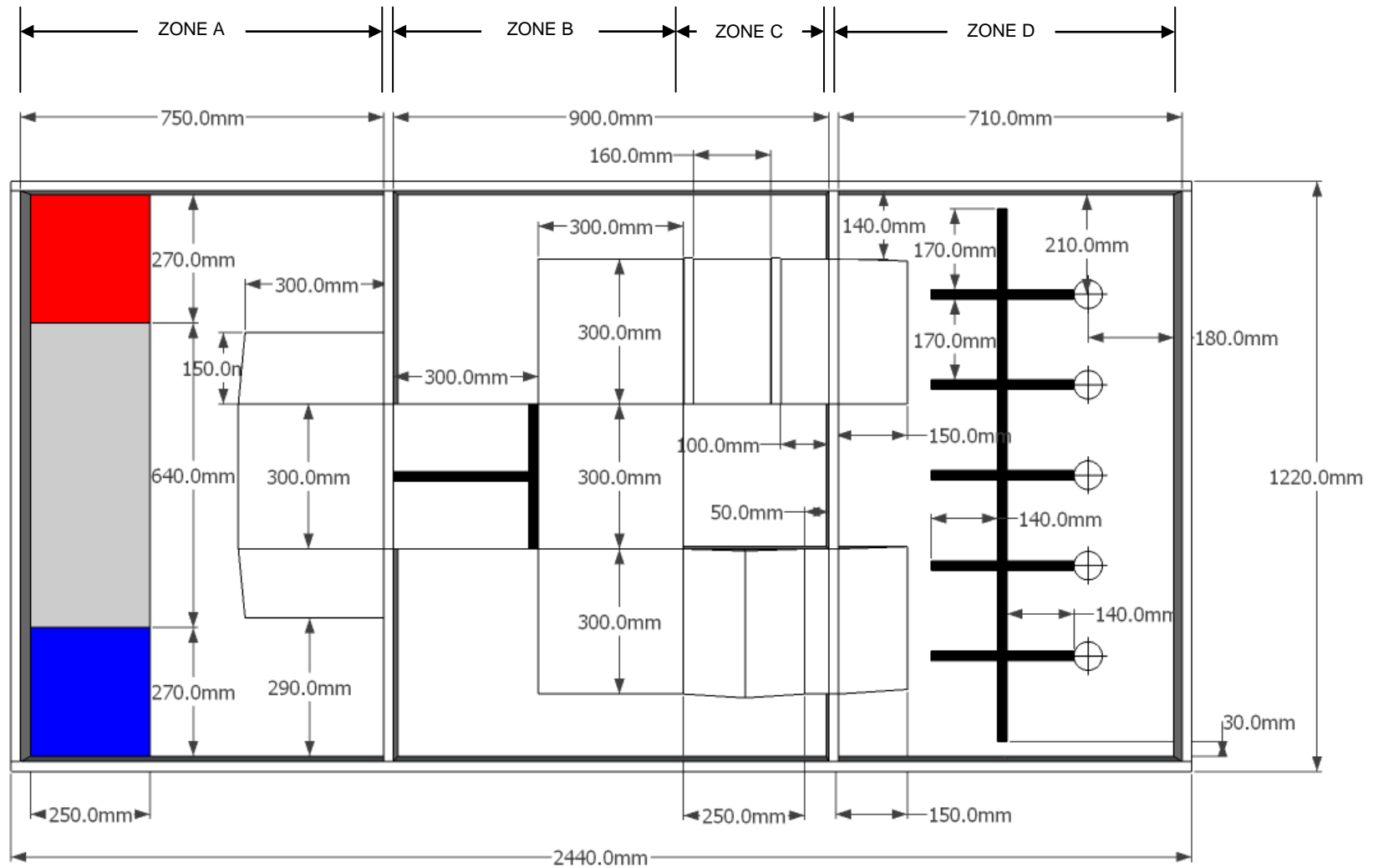
i.	Game Table in 3D.....	3
ii.	Table Specification I.....	4
iii.	Table Specification II.....	5
iv.	Table Specification III.....	6
v.	Table Specification IV.....	7
vi.	Game Description.....	8
vii.	Rules & Regulations.....	9
viii.	Scoring.....	12
ix.	Scenarios.....	14

Game Table in 3D



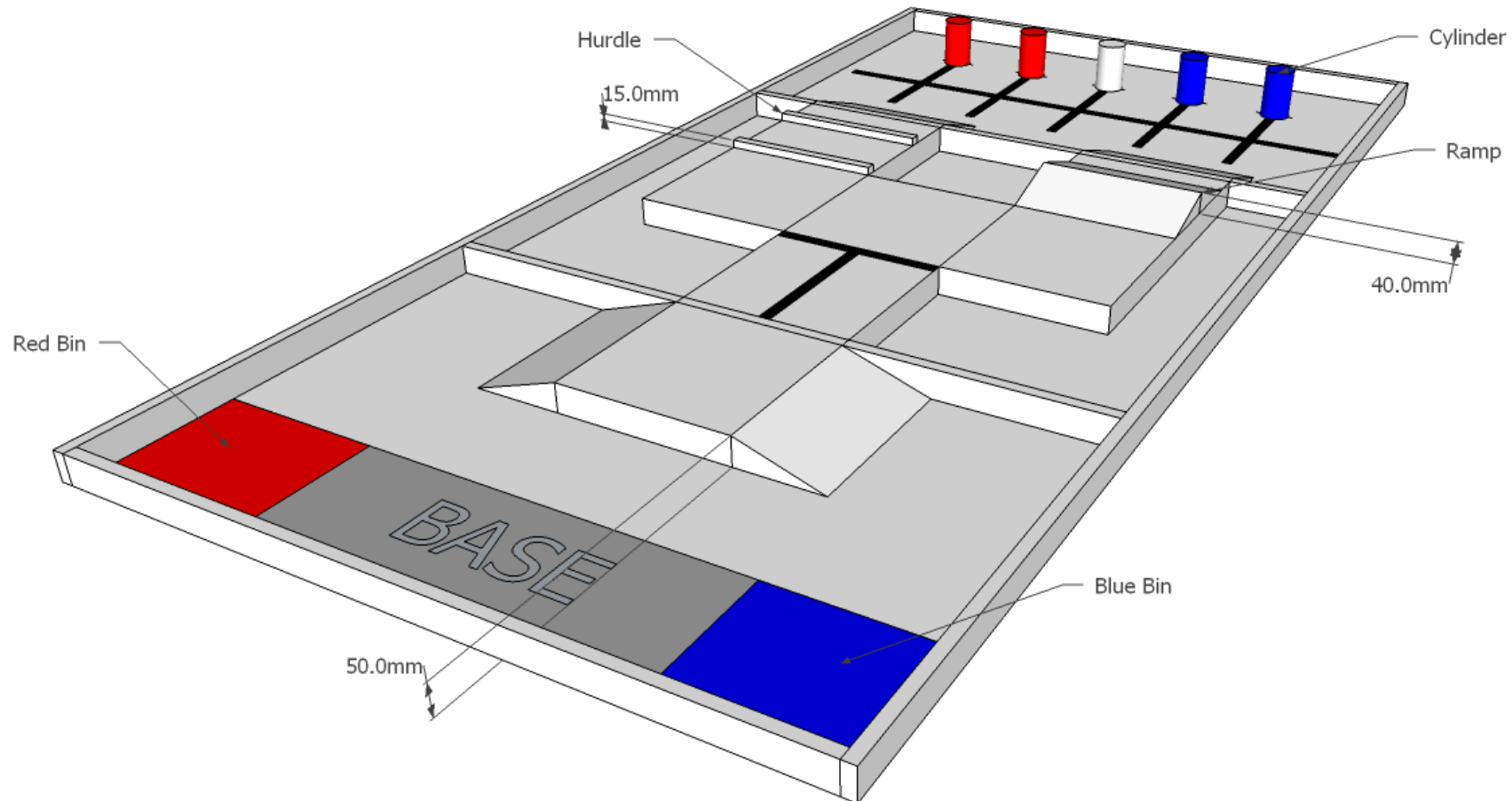
* All coloured cylinders are randomly placed.

Table Specification I



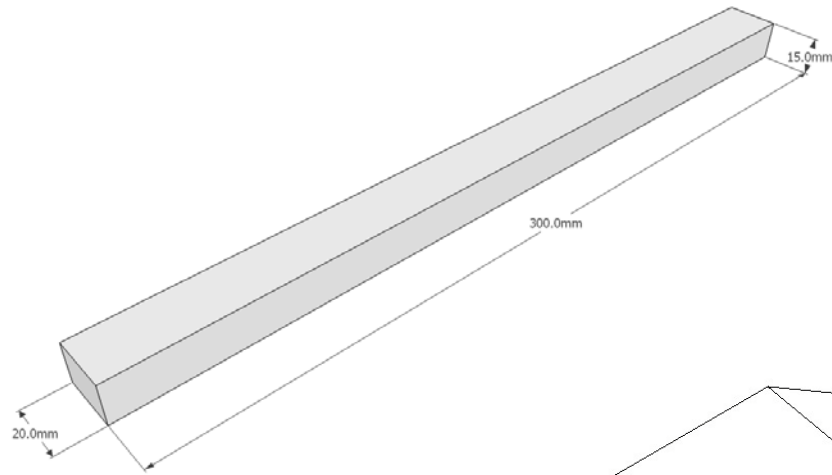
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Table Specification II

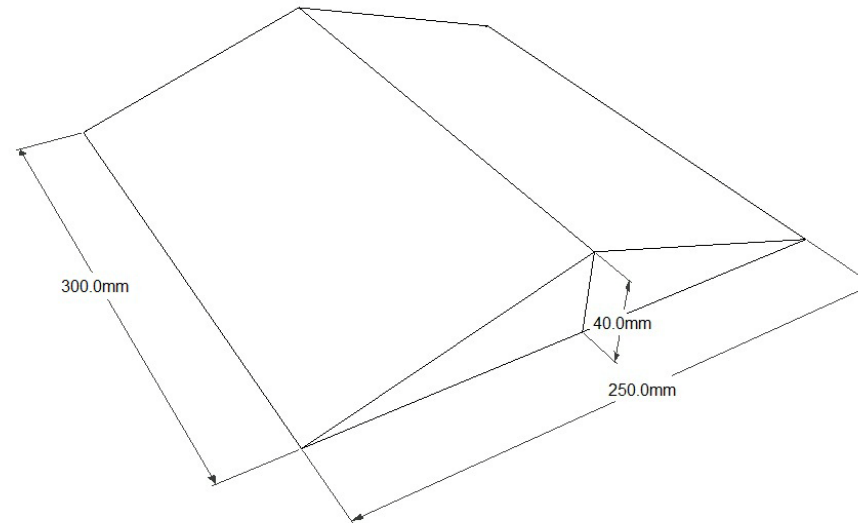


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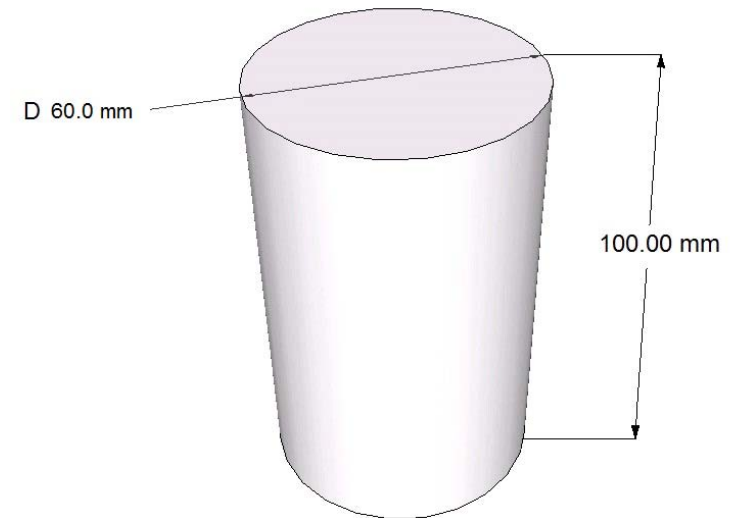
Table Specification III



i. Hurdle dimensions.



ii. Ramp dimensions.



iii. Cylinder dimensions.

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Table Specification IV

1. The size of the game table is 2440mm X 1220mm.
2. The size of the base area is 640mm X 250mm.
3. The size of the colour bins is 270mm X 250mm.
4. The size of the hurdles is 20mm(w) X 15mm(h) X 300mm(l).
5. The size of the ramp is 250mm(w) X 40mm(h) X 300mm(l).
6. The width of the black lines is 20mm.
7. For challenge objects, 5 cylinders with a size of 60mm(d) X 100mm(h) each will be used. They will be made out of paper core, weighing about 70g each.
8. The height of the bridge connecting zone A, zone B, zone C, and zone D is 50mm.

Game Description

The name of this year's lower secondary school regular category challenge is "Robot Columbus".

This year's theme, "Robots Connecting People" encourages you to build robots that can fit in with human society. In order to achieve that, you must first explore and understand human nature.

Exploration has powered human civilizations for centuries. People have explored vast seas, great mountains, rolling plains, and dangerous jungles in search of resources. Think oil rigs and mining colonies. Resources are important because they allow us to shape the environment we live in. Have you wondered how different it would be if we did not have cars, buildings, and electricity? When people lack a certain resource, they trade with others to obtain them. That is how towns, cities, and nations are born.

This year's lower secondary school game challenges you to build a robot that is capable of exploring rough terrain in search of useful resources. Once they have been found, bring these valuable resources back home to trade!

Rules & Regulations

1. All participants must be seated at their designated competition areas for check time prior to assembly time (refer General Rules 2012). Only participants are allowed in the competition areas from this point forward.
2. The time given for the robot to complete the challenge is 2 minutes. Time begins at the point when the judge gives the signal to start.
3. The robot must be placed in the Base area with the NXT/RCX brick switched off. Once physical adjustments have been made to the satisfaction of the participants, the judge will give the signal for the NXT/RCX brick to be switched on and a program to be selected (but not run). In the event where running a program immediately sets the robot in motion, wait for the judges's signal to start before running the program.
4. In the event where running a program *does not* immediately set the robot in motion, participants are allowed to run their program before the judges's signal to start, but no further human inputs are allowed after that. The only exception to this rule is when sensors are used to set the robot in motion, but even so participants are limited to just one interaction only. Judges must witness all of this, and upon his or her satisfaction, the signal to start will then be given.
5. The maximum dimensions of the robot before it starts must not be more than 250mm x 250mm x 250mm. After it starts, the dimensions of the robot are not restricted.

6. The robot must start in the Base area. Any part of the robot is not allowed to exceed the Base area before it starts.
7. The robot's mission is to travel from zone A to zone D (see page 4) across the bridge, collect the coloured cylinders (i.e. "good resources"), and place them completely into their respective colour bins in a vertical position (resources must be kept with care!) back in zone A. There are 4 coloured cylinders in total:
 - a. 2 red cylinders.
 - b. 2 blue cylinders.
8. The white cylinder is a bad resource and should not be collected. A penalty will thus be incurred if the white cylinder is carried out of zone D completely.
9. The positions of all 5 cylinders will be randomly decided at the start of each round (post-quarantine). The positions of the cylinders will be fixed for all participants in that particular round.
10. In the event of any ambiguity, note that the judge will pass the final verdict and will decide in the negative (i.e. the worst outcome available) according to the context of the situation.
11. Your attempt and time will end if:
 - a. Any part of the robot touches the mat (i.e. "river") in zones B and C.
 - b. Robot is touched by any team member after it has been set in motion.
 - c. Challenge time (2 minutes) has ended.
 - d. All 4 cylinders have been placed into their respective colour bins completely in a vertical position.
 - e. Violation of the rules and regulations herein.

Scoring

1. Score will only be calculated at the end of the challenge or when time stops.
2. Robot moves from zone A into zone B completely = 10 points (only once).
3. Robot moves from zone B into zone D completely (or vice-versa) via Hurdles = 10 points (only once).
4. Robot moves from zone B into zone D completely (or vice-versa) via Ramp = 10 points (only once).
5. Each red or blue cylinder placed completely inside the correct bin and in a vertical position = 50 points.
6. Each red or blue cylinder brought completely back into zone A but not placed *completely* inside the correct bin, not placed in a *vertical* position, or placed inside the *wrong* bin = 20 points.
7. Each red or blue cylinder not in zone A = 0 points.
8. The white cylinder is carried out of zone D completely = penalty 10 points.

9. Maximum score = 230 points. Breakdown:
- a. 10 points (move from zone A to zone B).
 - b. 10 points (move from zone B to zone D through Hurdles, or vice versa).
 - c. 10 points (move from zone B to zone D through Ramp, or vice versa).
 - d. 200 points (2 red cylinders inside red bin completely in a vertical position; 2 blue cylinders inside blue bin completely in a vertical position).
 - e. No penalty (white cylinder remains in zone D completely).
10. If teams acquire the same score, ranking is decided by the fastest time recorded.

Scenarios

Q. How would the judge keep track of the points earned for moving from zone to zone?

A. There are 3 checkpoints where you get to score these points (see page 11). During your attempt if your robot successfully crosses a checkpoint, the judge will award you with a cookie. Each cookie is worth 10 points. At the end of the match, all the judge has to do is to count the number of cookies you have, and he or she will know the score!

Q. In scoring rules 2, 3, and 4, what do you mean by "only once"?

A. These points can be earned only once during your attempt. Travelling through these checkpoints multiple times do not score you multiple points. In other words, you will only ever get 3 cookies at best, one for each checkpoint.

Q. How do you define "completely" as stated in the Scoring section?

A. The term "completely" here means that the object in question (i.e. robot or cylinder) must fully cross the borders separating the two areas in question (i.e. zones or bins). If any part of the object is touching any part of the borders, it will not be judged as "completely".

Q. Are the black lines printed or taped on?

A. Black lines in zone B are taped on; black lines in zone D are printed.

Q. For the last cylinder, will I still score if it was carried into the correct colour bins inside or on top of the robot?

A. In order to score the full 50 points, all red and blue cylinders must be placed into the correct colour bins in a vertical position touching the mat fully at the end of your attempt, regardless if your robot is carrying them or not. Otherwise, you will only score 20 points (counted as brought back into zone A). In the event where ambiguity arises, note that the judge will decide in the negative (i.e. the worst outcome available) according to the context of the situation.

Q. How do you treat parts that are detached from the robot?

A. Parts that are detached from the robot will no longer be considered to be a part of the robot.

Q. Can you give an example to illustrate what "the worst outcome available" means in Rules & Regulations point number 10?

A. Sure. An example would be whether a cylinder has been placed "completely" inside the correct bin in a vertical position. If after a fair assessment of the situation, participants and judge(s) still cannot agree whether a cylinder has been placed "completely" inside the correct bin (perhaps the edge of the cylinder is extremely close to the inside border of the bin), the judge(s) will rule that the cylinder has not been placed "completely" inside the bin and the team will not get the 50 points.