# WRO 2015

**Regular Category** 

Junior High School

Game description, rules and scoring

# **Treasure Hunt**

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#### **Game Description**

The name of this year's Junior High school regular category challenge is "Treasure hunt".

This year's theme, "Robot Explorers", encourages students to build robots that can investigate and explore different environments. Often explorers may rely on clues to guide their exploration throughout the unknown terrain. Other times, explorers may wander around while attempting to find what they are looking for. Explorers must also take care on their expeditions. The environment may pose a real risk to them.

The junior high school level game challenges you to build a robot that is tasked with collecting 5 artifacts in an unknown environment. Clues are available regarding the environment and the location of each of the artifacts to collect. The environment will contain artifacts that are harmful to the explorer, in unknown locations, that should be left undisturbed.



#### **Rules & Regulations**

- 1. All participants must be seated at their designated competition areas for check time which is prior to assembly time. Only participants are allowed in the competition areas from this point forward.
- 2. The competition format for this challenge is:
  - a. Qualifying rounds (best score taken).
  - b. Quarterfinals (1 round).
  - c. Semifinals (1 round).
  - d. Finals (1 round).
- 3. Assembly time for this challenge is 150 minutes and will occur before qualifying round 1.
- 4. Maintenance time for each subsequent round is as follows:
  - a. For qualifying round 2, 45 minutes.
  - b. For qualifying round 3, 30 minutes.
  - c. For quarterfinals round, 15 minutes.
  - d. For semifinals round, 15 minutes.
  - e. For finals round, 10 minutes.
- 5. The robot will have 2 minutes to complete the challenge. Time begins at the point when the judge gives the signal to start. The robot must be placed in the starting area. Once physical changes have been made to the satisfaction of the participants, the judge will give the signal for a program to be selected (but not run). Participants must wait for the judge's signal to start before setting the robot into motion (run the program).
- 6. 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.
- 7. The robot must start in the area outside the large grid. No part of the robot is allowed to touch the black line and/or the edge of the large grid before it starts.





- 8. At the start of each round (post-quarantine), the coordinate system for the round will be randomly chosen.
- 9. The coordinate system consists of a four by four grid. Each column and row of the grid is represented by one of four colors (red, green, blue, and yellow).
- 10. The coordinate system will be displayed on the table by placing 8 colored tiles in the square cutouts outside of the grid. This is known as the map key. The first four tiles give the colors of the rows on the table. The second sequence of four tiles gives the colors for the columns on the table. The last two colors in the starting grid represent the row and column of the first artifact to be collected.





11. Colored tiles and valid artifacts will be placed on the game table (post quarantine) in such a way that the color of the LEGO cube indicates the color of the row in which the next valid artifact is located, and the tile under the cube will indicate the column in which the next artifact is located. The last 2 colored tiles of the 10 colored tiles on the map key represent the intersecting row and column of the first artifact in this chain of information. Together with the information collected from scanning the starting grid, it is possible to determine the location of each successive valid challenge artifact based on the cube color and the color of the tile beneath it. A white tile will be placed under the final valid artifact in the chain.





- 12. There will be five artifacts that need to be collected within the challenge.
- 13. There will be a maximum of 2 additional artifacts on the table which **should not** be disturbed. These will be represented by a colored LEGO cube placed on a **BLACK** tile. This represents an artifact that is harmful to the explorer. If, at the end of the challenge, cubes have been moved and BLACK tiles have been uncovered, they will incur penalty points.



- 14. A tile will be placed at both ends of each of the grid lines indicating the color associated with that row or column.
- 15. The placement of all colored tiles and colored LEGO cubes will be the same for all teams in a given round.
- 16. The robot's mission is to collect all valid challenge artifacts from the large grid and return to the area outside the large grid carrying the objects.
- 17. The colors of the LEGO cubes will be: Red, Green, Blue, and Yellow. (See Table Object Specifications I)
- 18. The colors of the solid color tiles will be: Red, Green, Blue, Yellow, Black, and White. (See Table Object Specifications II)
- 19. The artifacts do not have to be collected in any specific order.
- 20. If there is any uncertainty during the task, the judge makes the final decision. They will bias their decision in the worst outcome available for the context of the situation.
- 21. Your attempt and time will end if:
  - a. Any team member touches the robot after it starts
  - b. Challenge time (2 minutes) has ended.
  - c. The robot has completely left the game table.
  - d. Violation of the rules and regulations within.



#### **Scoring**

- 1. Score will only be calculated at the end of the challenge or when time stops.
- 2. Every valid colored LEGO cube moved from its grid location = 5 points.
- 3. Every valid colored LEGO cube loaded onto the robot = 10 points.
- 4. Every valid colored LEGO cube on the robot, with the robot in the finish area = 5 points.
- 5. Every black tile disturbed during the challenge = -25 points.
- 6. Every black tile uncovered during the challenge = -50 points.
- 7. Maximum score = 100 points. Breakdown:
  - a. 25 points (5 valid colored LEGO cubes moved from their grid locations x 5 points)
  - b. 50 points (5 valid colored LEGO cubes loaded into the robot x 10 points)
  - c. 25 points (robot finishes outside large grid carrying 5 valid challenge objects x 5 points)
  - d. NOTE: No points are scored for moving/loading/carrying invalid artifacts (LEGO cubes covering a black tile).
- 8. If teams acquire the same score, ranking is decided by the fastest time recorded.



## Game Table in 3D







The table surface is printed on thick cardstock. All of the 32mm x 32mm squares are cut out of this layer, so that the colored tiles fit into the cutout.





The 32mm X 32mm tile cutouts are printed on both sides. One side of the cutouts have a solid color and the other side have a "+" pattern which completes the pattern of two intersecting lines. This will speed up configuration before challenges as unused tiles can simply be flipped.





Each of the orange squares and small white squares in the intersections of lines represents a 32mm x 32mm cutout.

The blocks in the large grid are all approximately 388mm x 217mm.

All black lines are 20mm in width.

There is a 127mm space on either side of the black lines surrounding the 10 orange blocks



#### **Technical specifications II**

- 1) The table is 2400mm x 1200mm in exterior dimension.
- 2) The walls at each edge of the table are 17mm in thickness and 50mm in height.
- 3) The lines are printed on a thin cardstock, and 32mm x 32mm squares are cut out of the surface at each intersection of lines in the large grid and at each place designated by an orange square.
- 4) Tiles 31mm x 31mm of the same thickness as this material are printed on both sides, one side contains a solid color and the other side contains a pattern matching the intersection of two lines.
- 5) The challenge objects include the tiles mentioned in rule 4 as well as blocks made of regular 2x4 LEGO bricks.
- 6) The line of 10 orange squares and the 16 orange squares at the edges of the large grid will have solid color tiles placed in the openings.
- 7) The squares at the intersections of the lines in the large grid will have either the patterned tile which completes the intersection or a solid colored tile placed in them.
- 8) Cubes made of regular 2x4 LEGO bricks will be placed on the solid colored squares within the grid.



#### **Table Object Specifications I**



(It's recommended that 5 of each color be made per table)







## **Color Specifications**

Color	Lego Color	СМҮК				RGB			PCP	
Name	ID	Pantone	С	М	Y	к	R	G	В	Sample
Bright Red	21	032C	0	100	100	0	237	28	36	
Bright Blue	23	293C	100	47	0	0	0	117	190	
Bright Yellow	24	116C	0	19	100	0	255	204	2	
Bright Green	37	355C	88	0	100	0	0	172	77	

More Accurate \_\_\_\_\_ > Less Accurate

