

2014 NRC Regular Category

Primary School

Game description, rules, & scoring

ROCKET

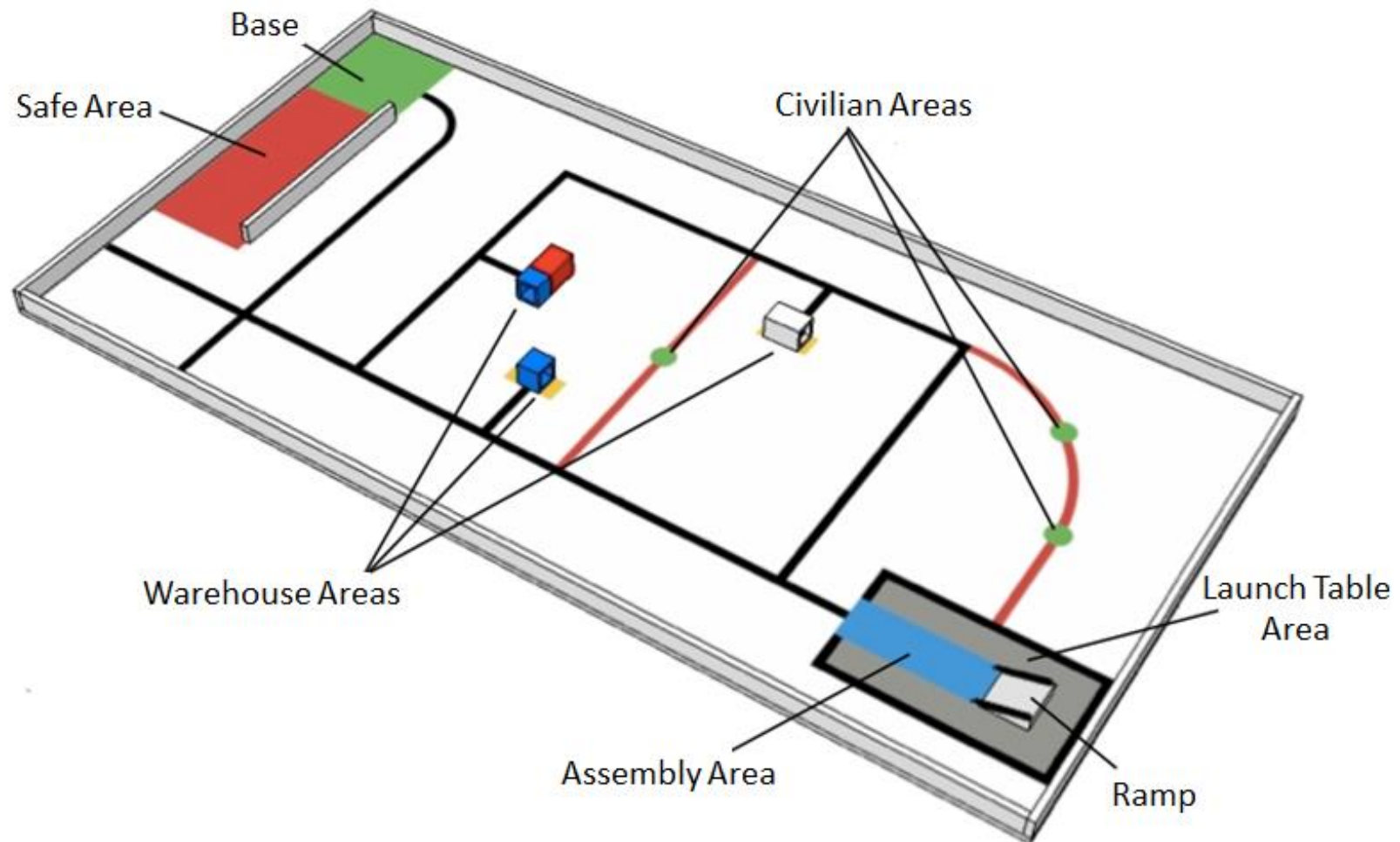
(FINAL COMPETITION)

1. Prelude

Gagarin, Sputnik, Lunokhod – all world famous Russian names in space. Since their time space voyages have become common - dozens of people are constantly in orbit and rockets are launched into space frequently. The conquest of outer space is perhaps the most exciting journey in the history of mankind. New spacecraft fly themselves to the place of their permanent deployment. From the launch area to their final destination they are on their own. But before they are ready to go into space you must transport the rocket elements from the factory to the launch site. Next, assemble the rocket and place the elements in your launch facility. Raise the rocket to a vertical position and the rocket is ready to launch. Before launch, make sure all persons are evacuated to the safe area.

2. Challenge

2.1. Table Definitions



2.2. Challenge Objects

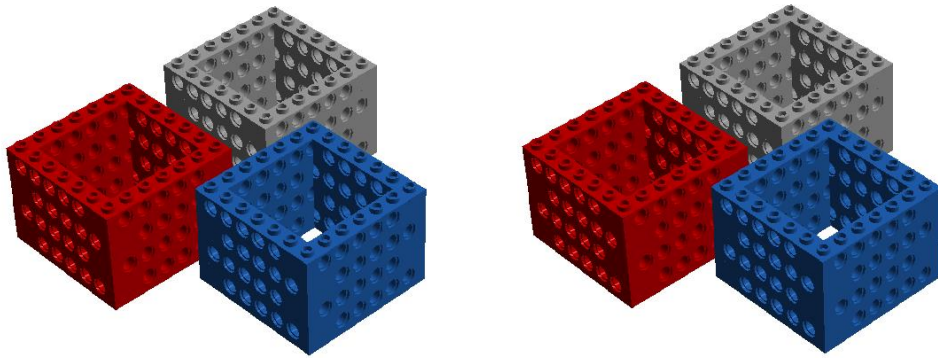


Figure 1. Rocket Parts (consists of 2 grey, 2 red, 2 blue parts).

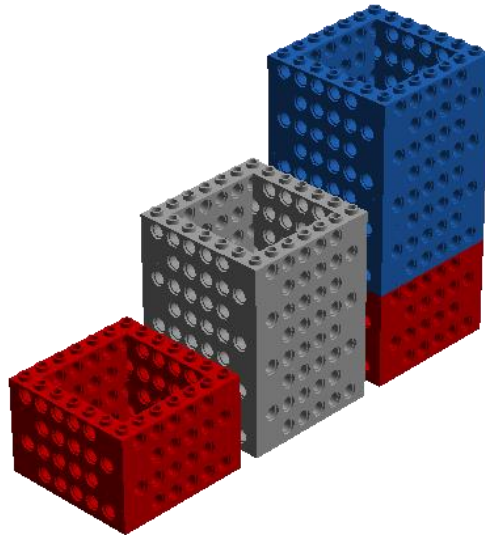


Figure 2. Rocket parts are assembled into Rocket Elements. There are three Rocket Elements of different lengths. In each round, an Element of one Rocket Part, an Element of two Rocket Parts, and an Element of three Rocket Parts are used.



Figure 3. Civilians (one LEGO brick 2x4 and a mini figure per civilian) are placed in the Civilian Areas (one Civilian in each green circle).

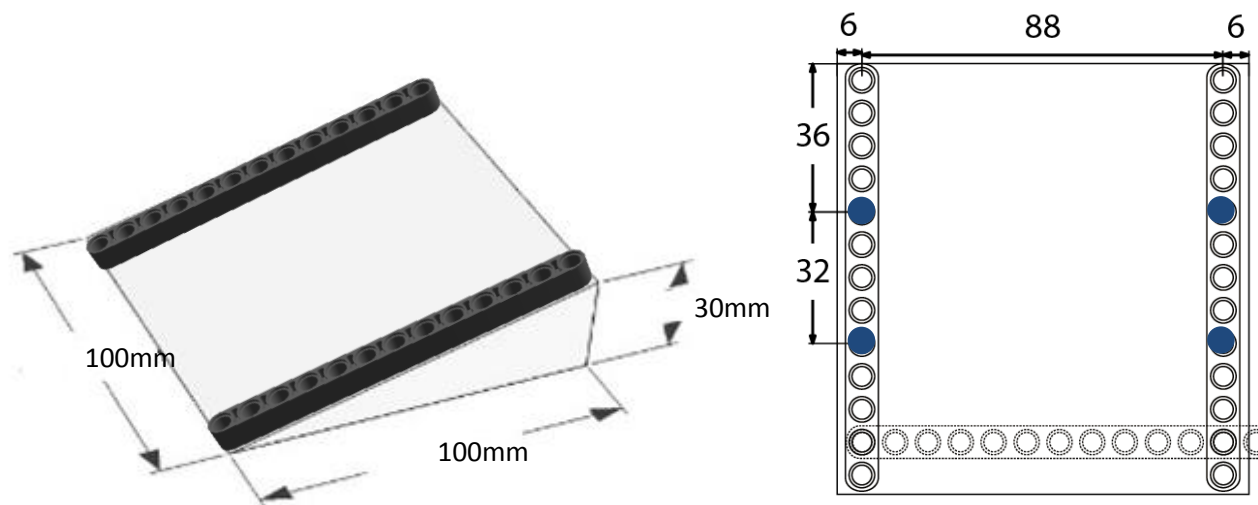


Figure 4. Ramp (an inclined surface with 100mm x 100 mm and rise 30 mm) The Launch Pad Base is two 13m Technic Beam mounted on both sides. The holes in the LEGO beams marked on the picture below by blue color are used to mount the beams with screws on the table.

2.3. Challenge Overview

The robot's mission is to assemble Rocket Elements in the Assembly Area, place the Rocket Elements vertically over the Ramp in the Launch Table Area, and evacuate all Civilians to the Safe Area.

3. Match Definition

3.1. Rules & Regulation

1. The robot must be placed in the start area with the RCX/NXT/EV3 switched off. Once physical adjustments have been made to the satisfaction of the participants, the judge will give the signal for RCX/NXT/EV3 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 judges' signal to start before running a program.
2. In the event where running a program does not immediately set the robot in motion, participants are allowed to run their program before judges' 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/her satisfaction, the signal to start will then be given.
3. The maximum dimensions of the robot before it starts are 250 mm × 250 mm × 250 mm. After it starts, the dimensions of the robot are not restricted.
4. The robot has to be placed within the Base area completely. No part of the robot is allowed to exceed the Base area before the match begins.

5. The combination of the rockets elements is determined in the competition day before assembly time. In order to do this 6 cards with possible combinations (Figure 5) are put in a non-transparent box (draw out cards). One of the card is taken for the box and it will determine the combination of the rocket elements which will be used in all rounds during this competition day.

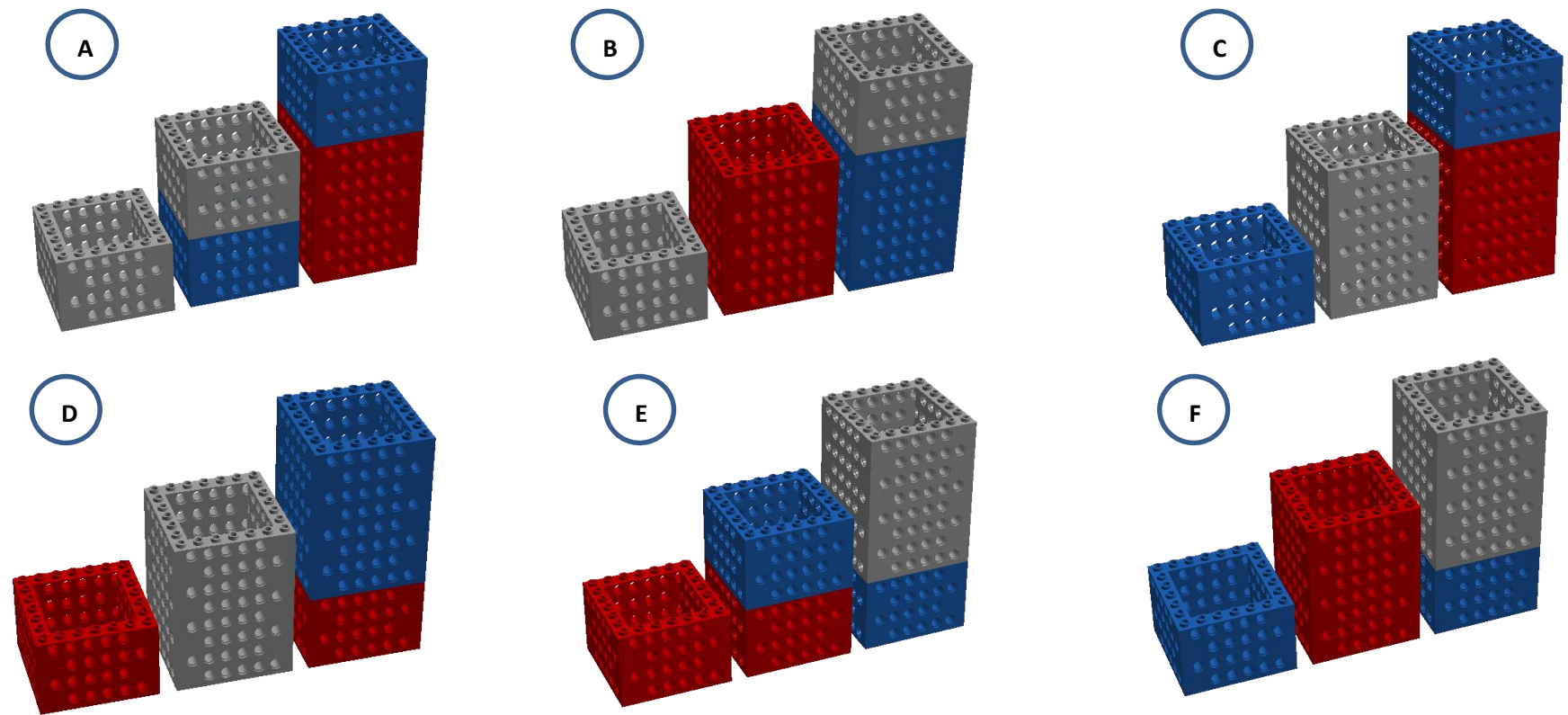
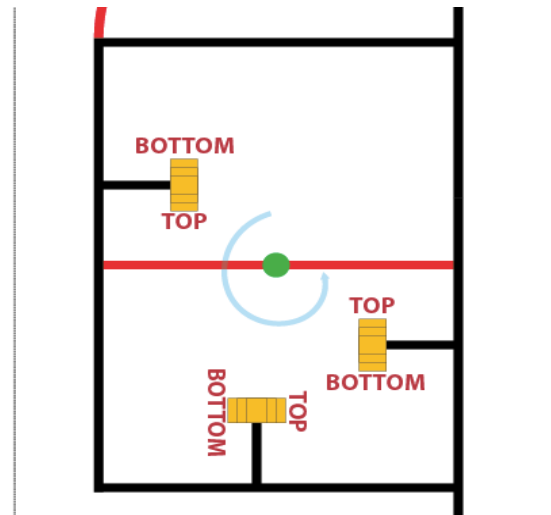


Figure 5

6. At the start of each round (post-quarantine), the location of every rocket element on the playing field is determined. 3 cards with numbers representing the rocket parts in a rocket element are put in non-transparent box. The cards are taken one after another and a rocket element with the corresponding number of parts is placed in the Warehouse. The location of the elements will be fixed for all participants in the round. This method to determine the location of the elements will be made for every round during the competition day. The Rocket Elements are placed in the center of the Warehouse Areas (Yellow), with the LEGO studs facing TOP direction (Figure 6).

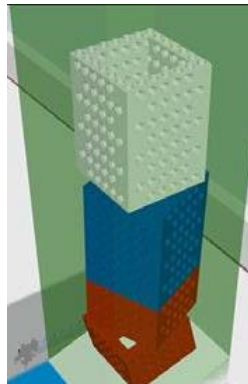
Figure 6



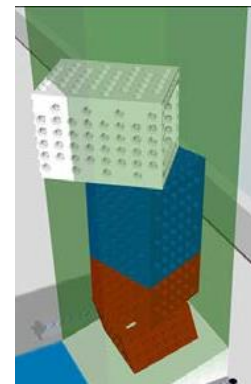
7. Participants are allowed to use Launch Pad Base to build a Launch Facility, to lift up the Rocket elements. Launch Facility is a construction with maximum dimensions 250mmx250x250mm before start. After start the Launch Facility is allowed to change its size but The Launch Facility must be within the Launch Table Area (grey square area 445mm x 250mm) at the end of the match. Participants are given 30 seconds to setup the Launch Facility before the match begins. If teams fail to setup the Launch Facility within 30 seconds, they are still allowed to run the robot but every part of the Launch Facility must be removed from playing field.

8. Civilians that are placed in the Civilian Areas (green circles) need to be moved to the safe area completely.
9. All Rocket Elements must be placed in the correct order (from bottom: red, blue, grey) in the Assembly Area. After that, the Rocket must be placed vertically over the ramp in the Launch Table area. Rocket Elements is considered vertically placed if the projection of all Elements to the plane of the field is within the Ramp base (Figure 8).

Figure 7



Correct



Incorrect

10. The robot is considered to have returned to the Base Area completely if all parts of the robot are in the Base Area completely.
11. Your attempt and time will end if:
 - a. the robot or any other objects on playing field is touched by any team member after it starts
 - b. the challenge time (2 minutes) has ended
 - c. the robot has returned to the Base Area completely
 - d. the rules and regulations herein are violated
12. If at the moment the time stops the Launch Facility is still in action then the last action is canceled.
13. 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.

3.2. Scoring

1. Scores will only be calculated at the end of the match
2. Civilian completely in Safe Area = 5 points each
3. Rocket Element is not touching Warehouse Area = 5 points each
4. All Rocket Elements touch the Assembly Area at the same time = 20 points
5. At least one Rocket Element is placed vertically over the Ramp in the Launch Table Area = 10 points
6. All Rocket Elements are placed vertically over the Ramp in the Launch Table Area = 15 points
7. All Rocket Elements are placed vertically and in the correct order over the Ramp in the Launch Table Area = 15 points
8. Robot returns to Base Area completely = 10 points
9. Maximum score = 100 points
10. If two (or more) teams acquired the same score, ranking is decided based on the fastest time

Civilian completely in the Safe Area	Rocket Element is not touching Warehouse Area	All Rocket Elements touch the Assembly Area at the same time	Rocket Elements placed vertically			Robot returns to Base Area Completely
			At least one Rocket Element placed vertically	All Rocket Elements placed vertically	All Rocket Elements placed vertically in the correct order	
5 points each	5 points each	20 points	10 points	15 points	15 points	10 points

Table 1. Score allocation.

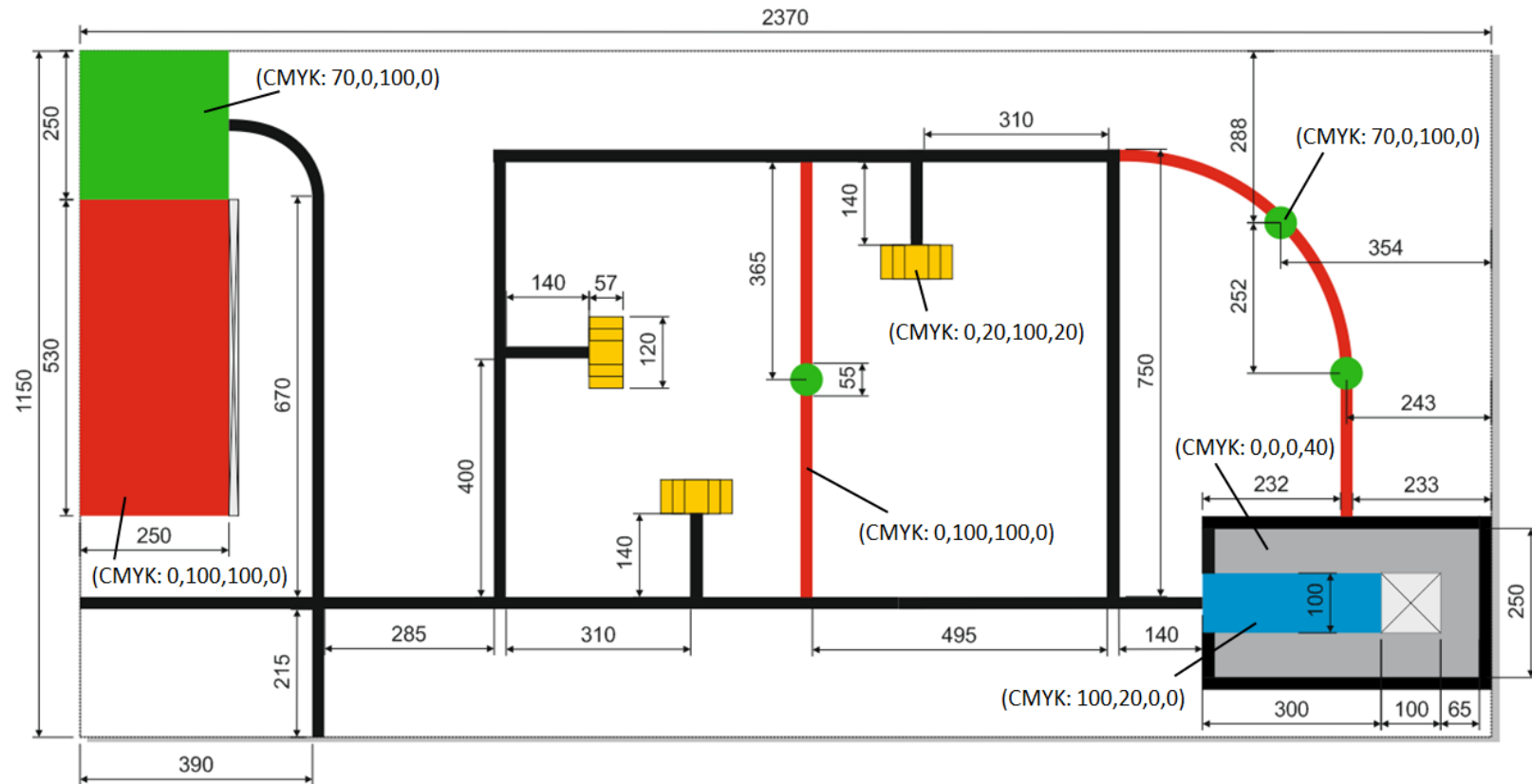
3.3. Scoring Example

	Round 1		Round 2	
	Team A	Team B	Team A	Team B
Civilians completely in Safe Area	2 Civilians (2 x 5pts = 10 pts)	3 Civilians (3 x 5pts = 15 pts)	3 Civilians (3 x 5pts = 15 pts)	3 Civilians (3 x 5pts = 15 pts)
Rocket Element is not touching Warehouse Area	2 Rocket Elements (2 x 5pts = 10 pts)	3 Rocket Elements (3 x 5pts = 15 pts)	3 Rocket Elements (3 x 5pts = 15 pts)	3 Rocket Elements (3 x 5pts = 15 pts)
All Rocket Elements touch the Assembly Area at the same time	No (0 pts)	Yes (20 pts)	Yes (20 pts)	Yes (20 pts)
At least one Rocket Element placed vertically	Yes (10 pts)	No, Launch Facility is in action when time stops	Yes (10 pts)	Yes (10 pts)
All Rocket Elements placed vertically	No (0 pts)	No, Launch Facility is in action when time stops	Yes (15 pts)	Yes (15 pts)
All Rocket Elements placed vertically and in the correct order	No (0 pts)	No, Launch Facility is in action when time stops	No, the order is not correct	Yes (15 pts)
Robot returns to Base Area completely	Yes (10 pts)	No (0 pts)	Yes (10 pts)	Yes (10 pts)
Mission Time	00:57.15	01:08.76	01:04.54	01:12.29
Final Score	40 pts	50 pts	85 pts	100 pts

Table 2. Scoring example.

4. Table Specifications

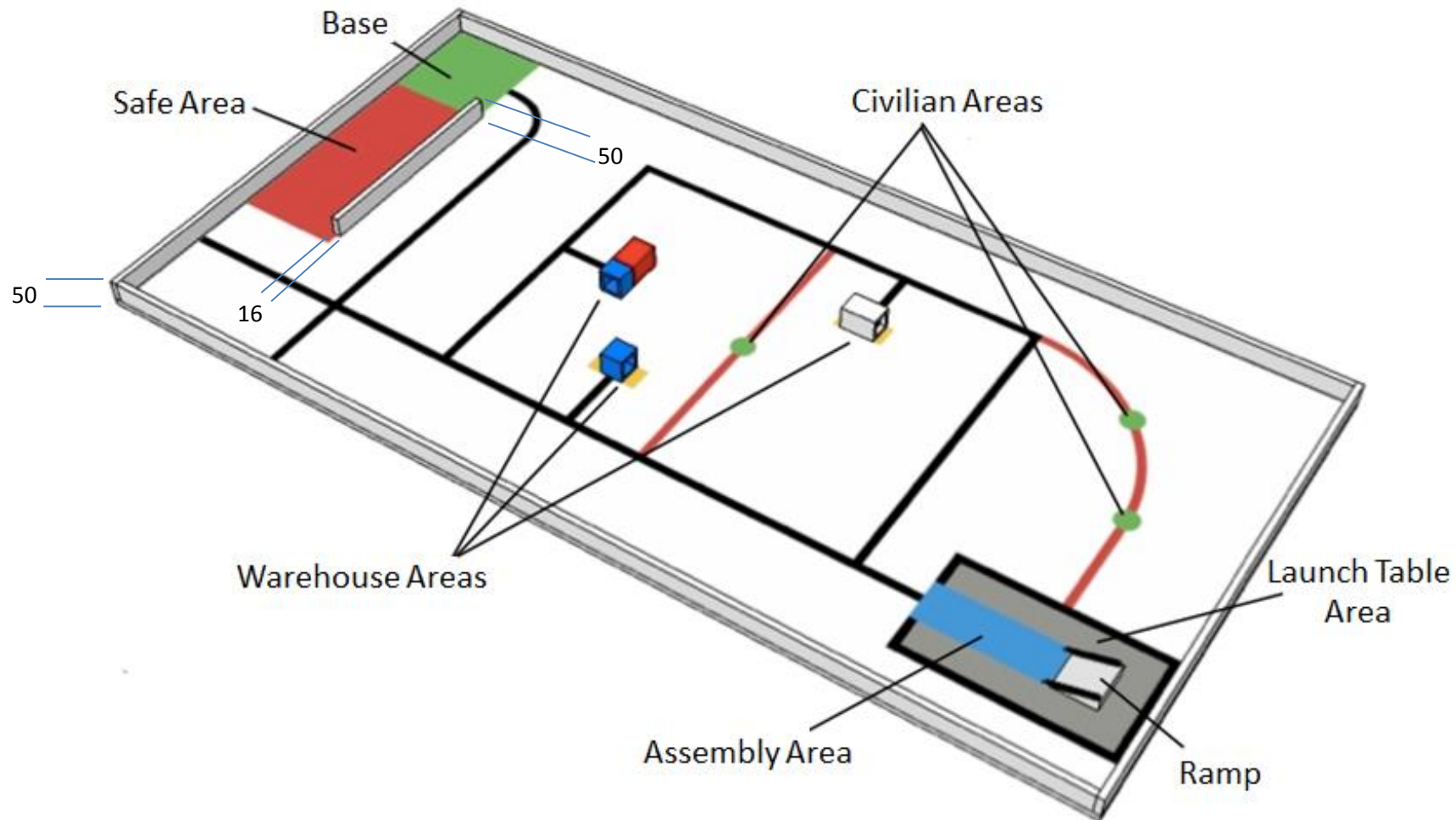
4.1. Horizontal Dimensions



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All size is in mm.

4.2. Vertical Dimensions



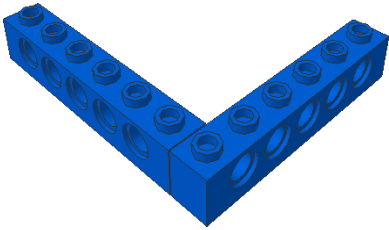
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All size is in mm.

4.3. General Information

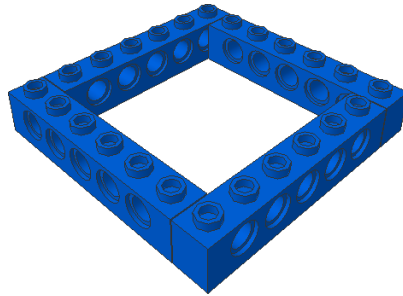
1. The internal dimensions of the playing field is 2370 mm × 1150 mm.
2. The playing field is surrounded by boundary walls 50 mm in height and 16 mm thick.
3. The playing field consists of Ramp, black lines, and wall.
4. The dimensions of Ramp is 100mm x 100mm with 30mm lifting. (see Figure 5)
5. The width of the black line on field ± 20 mm.
6. The Wall outside Safe Area is 50mm in height and 16 mm thick
7. The primary colour of the table is white.
8. The error tolerance of the field is ± 50 mm.

Building instruction for Rocket Parts

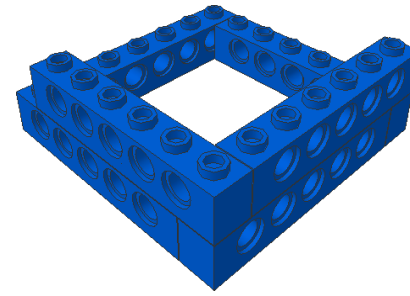
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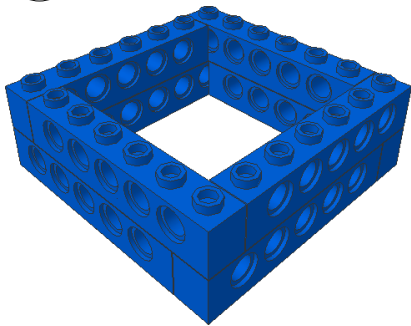
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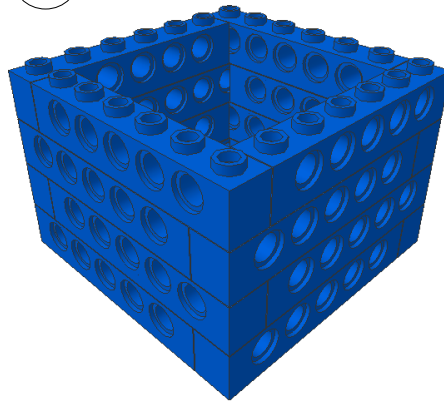
3



4



5



Frequently Asked Questions

Q. How do you define "completely" in scoring point number 8?

A. All parts of the robot including wires and/or extensions must be well within the Base Area in order to be considered "completely" entering the Base Area. 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. Are the black lines printed or taped on?

A. All black lines are printed.

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 part of the robot.

Q. How would the judge keep track of the points earned for all Rocket Elements touch the Assembly Area at the same time?

A. Scores will only be calculated at the end of the match. But this is the only exception. The moment the judge sees all Rocket Elements obviously touching the Assembly Area at the same time, condition will be recorded on the spot.

Q. Do broken objects score points assuming they are in scoring condition at the end of the match?

A. Broken objects can score if there is no question that the breakage was intentional, and every part of the objects (including broken parts) must be in scoring condition. (i.e. broken civilian can score as long as every parts are in the Safe Area completely.)

Q. Can you give an example to illustrate what “the worst outcome available” means in Rules & Regulations point number 11?

A. An example would be whether the robot has entered the Base Area “completely”. If after a fair assessment of the situation, participants and judges still cannot agree whether a robot has returned to the Base Area “completely” (perhaps a cable is overhanging extremely close to the boundary walls), the judge will rule that the robot has not returned to the Base Area “completely” and the team will not get any point for return to the Base Area completely.

Q. Must the Rocket Elements be placed right side up, that is with their studs facing upward in order to obtain points for Scoring No. 5, 6 and 7?

A. Yes, the Rocket Elements must be placed right side up in order to obtain points for Scoring No. 5,6 and 7.