ROBOTIQUE
ZONE 01
ROBOTICS

ASTROBOT

RULES AND DE-SCRIPTION OF 5 PEDAGOGICAL ROBOTIC PROGRAMS CREATED IN QUEBEC,

FOR ALL STUDENTS OF
5 TO 19 YEARS OLD

26-27 MARCH 2015

8TH PROVINCIAL FINAL OF
PEDAGOGICAL ROBOTIC

VERSION 1.0 - PUBLISHED ON 15-10-2014

PRESENTED AT

TO HU

READ THE RULES ON YOUR

TABLET...

... OR ON YOUR

COMPUTER !

BB.ca

Brault & Bouthillier

THANKS TO OUR PARTNER
AND OFFICIAL PROVIDER OF
MATERIAL

WWW.ZONE01.CA/BB

ROBOTIQUE ZONE 01

GENERAL RULES

ROOCKY PROJECT

JUNIOR CHALLENGES

SENIOR CHALLENGES

MAKE-ART PROJECT

PRO-ROBOT CHALLENGE

ALL THE CHALLENGES IN ENGLISH CAN BE FOUND AT
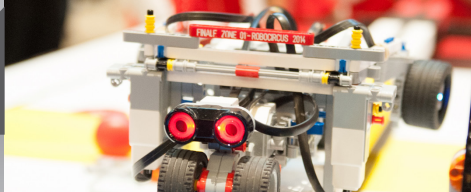
WWW.ZONE01.CA/2015CHALLENGES

CONGRATULATIONS !

You are about to join an adventure full of excitement and learning !

Robotics Zone01 offers for the 8th year in a row enlevants , relevant and appropriate for in class teaching and afterschool and based on the Quebec provincial curriculum.

Since the beginning of our journey, we are proud of the innovation you are showing each year to solve our challenges.

Robotics Zone01 will always promote perseverance, creativity, pride and innovation; this is what we are made of!

Again, we are innovating this year, offering your annual document in digital format for viewing on a tablet.

We think and your experience will be richer and always within reach of your design workshop!

So enjoy the many hours of fun and learning you have in front of you. We are already looking forward to seeing you !!

ASTROBOT

ACKNOWLEDGMENT

Robotics Zone01 would like to those who were involved in the writing challenges Zone01 2015 .

Georges Bourgouin - CS des Patriotes
Dominic Bruneau
Benjamin Carrara - Brault et Bouthillier
Yannick Dupont - LEGO Education
Yvan Émond - CS des Patriotes
Pierre Guiot-Guillain - Ruelle 80
Lysanne Landry - CS des Patriotes
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Anthony Pilorzé - Ruelle 80
Sonya Roussy - CS des Trois-Lacs
Érick Sauvé - CS de Laval
Rémy Taupier - Ecole Saint-Joseph (1985) inc.

A WARMFULL WELCOME !

Thank you for downloading this document, this is your entry to an exceptional experience... Welcome to the Zone01!

Each year we make adjustments to this document. You are a roocky or and experienced team, make sure you read and understand all the elements. Be sure all your team have a good comprehesion, in order to avoid confusion or frustrations!

Any questions? We are here: infos@zone01.ca

GENERAL RULES

GENERAL DEFINITIONS

The rules of this section apply to ALL educational robotic challenges created by Zone 01.

Student: A student must be between 5 and 17 years of age and enrolled in a school.

Responsible: An adult must accompany a team of students. This adult will be responsible for all communications relating to the co-opetition, rules of the challenges, etc. This adult may be a parent, a teacher, an educational consultant, etc. In 2014, this adult will be even more part of the team! The responsible adult may not be the principal of a school.

Team: all students of a team must be present during the final (except in a case of illness). The teams must be associated with a school or a parent is permitted to take the initiative in forming a team. In this situation, the team is registered as a parent-child team and they are permitted to participate like all other teams.
Number of students in a team:
A. Roocky (LEGO WEDO): 2 or 4 students
B. Junior (LEGO Mindstorms) : 2 to 4 students
    C. Senior (LEGO Mindstorms) : 2 to 4 students
   D. Robot-Pro (Tetrix): 4 to 10 students
    E. Make-Art: 2 to 4 students

REGISTRATION AND PARTICIPATION

All registrations must be submitted before the date indicated on the zone01.ca website. The registration fees, dates and details of the final event are posted on the zone01.ca website.

When registering, teams must choose a category according to their level of education:
A. Novice (LEGO WEDO): kindergarten to grade 4
B. Junior (LEGO Mindstorms): grade 4 to grade 6
C. Senior (LEGO Mindstorms): Secondary 1 to secondary 4
D. Robot-Pro (Tetrix): Secondary 4, 5 and CEGEP
E. Make-Art: Kindergarten, elementary and/or secondary
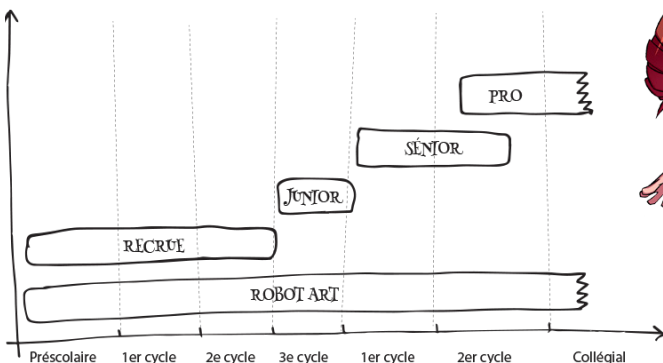
CHOOSING CHALLENGES

The adult responsible for a team has until February 1, 2014 to change or modify the choice(s) of their challenges. A team may not change their category.

For certain challenges, two levels of difficulty will be available: a white level and a black level

All teams are automatically enrolled at the white level. On site, a team may choose to

participate in a challenge at the black level, which is more demanding, but worth more points. (The awards, for each level, will be presented separately)

Choosing the WHITE OR BLACK LEVEL will have to be done during the first try and YOU WILL NOT BE ABLE TO CHANGE THE LEVEL AFTERWARDS. If the black level is chosen, the team will have to make all their trials at the black level.

See the point section for more details.

Maximum teams per school

A school may enter a maximum of 12 teams per category.
A school may participate in a maximum of 24 challenges per category.

For example, a school may register 2 teams in the junior category and have each team participate in 4 challenges, for a total of 8 challenges. Another school may register 12 teams in the junior category and have each team participate in 2 challenges, for a total of 24 challenges. This school would not be permitted to register all their teams for 3 challenges because this would result in a total of 36 challenges.

Maximum number of teams permitted in each category:
A. Novice: N/A
B. Junior: 80
C. Senior: 70
D. Robot-Pro: 10
E. Make-Art: N/A

The system of registration is a "first come, first enrolled" basis until the maximum number of teams in a category is attained.

Any student participating on the day of the Zone 01 event must sign an authorization sheet to gain access to the co-opetition site. Refunds will not be issued in case of a refusal.

ZONE 01 CO-OPETITION PHILOSOPHY

The Zone 01 CO-OPETITION is a mixture of cooperation and competition. Therefore, with educational robotics, our goal is to develop student's sense of teamwork, sharing and mutual respect for one another while allowing them to advance technologically and scientifically.

The FAIR PLAY rule requests all teams to respect the rules of the game described in the official document, but also the essence of the game. For all the challenges created by Zone 01, the "gray areas" are left voluntarily and involuntarily to provide room for creativity. If a team interprets the rules in a way to penalize another team, or to negatively influence a team's standings, the chief judge may request to change the strategy of this team.

ROBOT DESIGN

To participate in the co-opetition, participants must comply with the following rules:

A. During the preparation

Teams must provide their own robotics equipment as well as their own computers and electrical extensions.

All LEGO Mindstorms robotic systems will be permitted at the Zone 01 co-opetition. However, when participating in the events, it is possible, that the NXT and EV3 robotic systems are better adapted than the RCX robotic system.

Allowed robotic platforms for each cathegories

	RECRUE	JUNIOR	SÉNIOR	PRO	MAKE-ART
LEGO Education WeDo	X				X
LEGO Education Mindstorms RCX, NXT, EV3		X	X	X	X
Autre pièces LEGO	X	X	X	X	X
Tetrix, Matrix				X	X
Arduino				X	X
Makey Makey					X
Autre matériel				X (à valider)	X

Sensors and parts allowed in the Rookie, Junior and Senior categories

Sensors from third party vendors are permitted.

The Mindstorms sound sensor is not permitted.

It is forbidden to modify a LEGO piece in the construction of the robot. You cannot cut a LEGO piece; file down a LEGO piece or trim/streamline a LEGO piece.

If a rare LEGO piece (produced in very limited quantities which other teams would not be able to easily obtain through sites such as "Bricklink" or "LEGO Pick a Brick") is used, it must be in accordance with the rule of FAIR PLAY (see above). If you are not sure about a specific LEGO piece and/or the interpretation of FAIR PLAY, please communicate with us BEFORE the day of the co-opetition.

All robots must be able to operate autonomously, therefore, the team must program the robot in advance, except in the Senior C1 challenge.

Any programming language that is compatible with the robotic systems mentioned above is permitted (Robolab, NXT-G, EV3, Labview, RobotC, etc).

B. At the the co-opetition

To ensure the rules are followed, all robots will be inspected before the start of the challenge by the judge. In particular, the focus will be on the dimensions and the weight of the robot.

A robot CANNOT be used for more than one team and a student CANNOT be a member of more than one team.

Any device or equipment that may interfere with the transmission and reception of an infrared signal, Wifi or Bluetooth will not be permitted during the event.

DESCRIPTION OF PLAYING FIELDS (SURFACES)

Specifics for the 2015 edition

The creators of the challenges make every possible effort to describe the playing fields (surfaces) as exactly as possible.

Zone 01 enables schools to purchase the playing fields (surfaces) of the official challenges, by ordering them from the website www.zone01.ca.

Although it is not mandatory to purchase these playing fields (surfaces), it is recommended in order to calibrate the robot's sensors to their correct settings.
Some playing fields (surfaces) require a wooden construction. The drafting committee will publish photos of these wooden constructions on the website www.zone01.ca. They will also be made available to the teams during the training session in January 2014.

In any case, during the competition, the teams may not request a change of the official playing field (surfaces) or ask for special exemption or treatment. In other words, the official playing field (surface) is the one during the co-opetition. The teams (the robots) must adapt to the playing field (surface) at the co-opetition and not the contrary.

HELP: To avoid any frustration or disappointment:
Build your robots with the possibility of adapting or modifying it at the co-opetition.
You should not rely solely on the surface that you have constructed.
If you have any doubts about your strategy with the playing fields (surfaces), contact us before the event with your question!!

PROBLEM TO ONE OF THE CHALLENGES

The judges and the chief judge, may, at any time, question the design of a robot under the "FAIR PLAY" rule.
If the chief judge finds an infraction (irregularity), the team will have 5 minutes to comply with the rules.
If a team cannot comply within the 5 minute time limit, the team will receive "0" points for the challenge.

POINTS

If a team is registered for a specific challenge but decides not to participate, the team will receive "0" points for the challenge.

The scoring sheets that the judges will use at the co-opetition event will be available on the website: www.zone01.ca. These scoring sheets do not reflect the ultimate result of what the judges' view on the playing field (surface). The judges do not calculate the total points on-site.

BLACK and WHITE levels

All teams are automatically registered at the WHITE level.
Teams/schools who wish to go further can opt for the BLACK level, which provides for a tougher challenge. The BLACK level also enables the schools to acquire more points and to ultimately get closer in attaining the Zone 01 trophy.

A team that decides to participate in a challenge at the BLACK level will automatically be in the same grouping with other teams who also chose the BLACK level. These teams will only be able to receive medals designated for the BLACK level. They would not receive medals for the WHITE level.

NIVEAU BLANC	NIVEAU NOIR
CONSTRUCTION RÉGULIÈRE	CONSTRUCTION PLUS COMPLEXE
PROGRAMMATION SIMPLIFIÉE	PROGRAMMATION RICHE DE DÉFIS

Distribution of awards
 ATTENTION: This year (2014 edition) there are many changes for the distribution of prizes.

Here is the prize list that will be presented at the event:

Sponsor Prizes
These prizes and their award criteria will be revealed during the event.

Special Mentions

Changes for the 2014 edition

Is your robot unique or does it have an innovative mechanical design?
Have members of your team helped other teams in your school or elsewhere?
If you are the responsible adult for the team, have you noticed the improvement of a student in his/her attitude, behavior, work ethic, or simply in his/her robotic activity/project?

This prize category is linked to the student's preparation and not only to the performance/challenge at the event. We wish to emphasize the work of teams, students or even the responsible adult of a team who has not necessarily performed well in terms of accumulated points for the challenges, but in other important areas of educational robotics and co-opetition.

These prizes WILL BE AWARDED BASED ON A NOMINATION PROCESS. This year, the responsible adult of a team must register one or more students in order for them to have a chance at receiving such a prize. The form will be available on our Internet website as of November 1, 2013.

N.B. The panel of judges reserves the right to award any student a Special Mentions prize on site at the event.

The exact number of prizes will be unveiled at the closing ceremony.

MAKE-Art Category

In this category, an external committee of judges will assess the student achievements according to three main criteria:

Technical aspect
Artistic aspect
Appearance of the project in connection with the theme

Medals will be given to the projects that obtained the best results from the external committee of judges.

Junior, Senior and Robot-Pro Categories

Change for the 2014 edition

Gold and Silver Medals
For each challenge, the teams that have accumulated the 2 best scores in their respective level (White and Black) will receive the gold medal and the silver medal.

Bronze Medal
A bronze medal is awarded to the team having obtained the 3rd best score in ONLY the Junior Strongman challenge.

Participation Prizes
Junior, Senior and Robot-Pro Categories
Participation prizes will be randomly drawn.

Novice Category

Each novice team will receive a participation prize for having accomplished their first Zone 01 challenge!

Zone 01 Trophies

The Zone 01 Trophies, "Junior School of The Year" and "Senior School of The Year" will be awarded to the school with the best overall performance. To be eligible, a school must meet the following criteria:

You entered at least 2 teams in the competition;
You have participated in all 4 challenges of the Junior or Senior category;

N.B. The results obtained in the Junior Strongman challenge are not used in the overall calculation for best performance, but the school should have participated in this challenge in order to be eligible for the trophy.

The schools that are awarded the Zone 01 trophy are responsible for building next year's trophy in the same category.

TO PARTICIPATE IN THE WRO

Teams that wish to qualify for the WRO must meet the following

1. Be part of a team of 2 or 3 students (teams of 4 are allowed to Zone01 but WRO only accepts teams of 2-3 students)
2. Register into the challenge WRO and at least one challenge Robotics Zone01
3. Report via the registration system Zone01 its intention to qualify for the WRO
4. Being able to travel in the period of November
5. Be willing to make fundraisers and participate in promotional events

2014-2015 SEASON

AUGUST

- Robotic season launch
- 5 robotics programs are published, except for the WRO challenges

SEPTEMBER

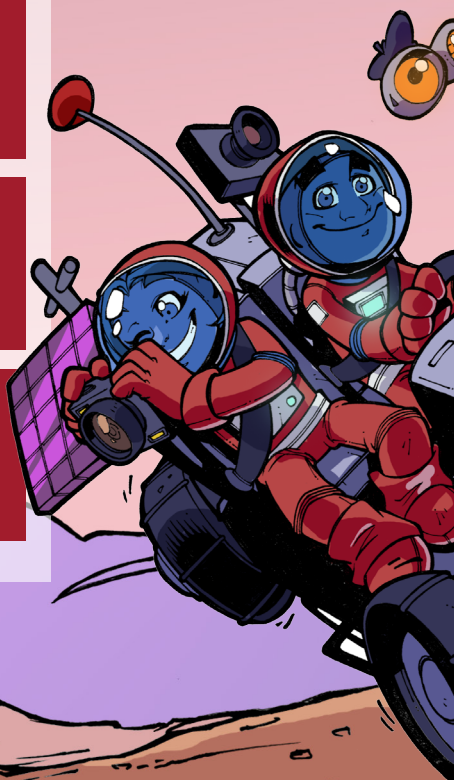- Registration opening for all Quebec events

OCTOBER

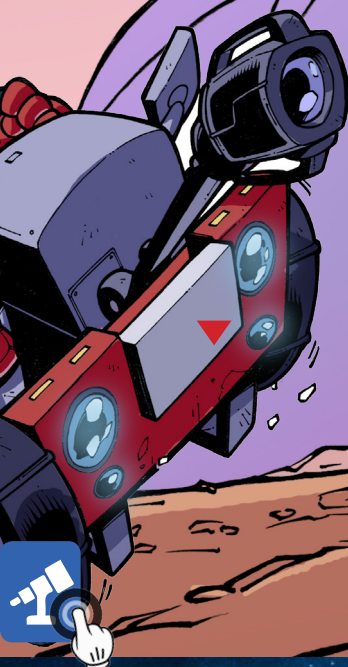- All categories registration

NOVEMBRE

- WRO International, the 2014 pedagogical robotic final winners represent CANADA in Sochi.

DECEMBER

- Bi-annual Zone01 Pedagogical Challenge Commity; to get involved infos@zone01.ca

JANUARY

- Kickoff of 2015 WRO challenges (Junior et Serior) for the Zone01 Robotic 2014-2015 season
- Zone01 Training (dates to be confirmed)

FEBRUARY

- All team details must be provided
- Practice, Practice, Practice !

MARCH

- 2015 Provincial Pedagocial Robotic Final, ToHu

3-2-1...Takeoff!

Learning situation

We must quickly join an astronaut left in space. Several technologies exist, but the good old rocket launcher remains an economic and spectacular solution. Pay attention to the trajectory, the mass, the distance and the accuracy - they can sometimes be relative!

Level of difficulty
Programming : 1/3
Design : 2/3

Overall Function of the Robot

On the launch area (play mat), the robot has to carry, pull and move a weight of 1000 g or more and leave it in one of the colored area. It must then move quickly to the red area to launch its orbiter (rocket). The farther the rocket lands, the more points are collected.

Robot Description

The robot must perform two distincts tasks : pull or push a weight and launch a rocket. It must therefore be capable of force and acceleration. To launch the orbiter (rocket), it is assumed that a catapult would be the most effective technology.

The size of robots participating in this challenge must not exceed the following limits at the start:

    A. Length: 30 cm
    B. Height: 30 cm
    C. Width: 30 cm
    D. Weight: 1 kg (1000 g)

Surface Description

The total surface area is 1,22 m (4 feet) wide by 4,88m (16 feet) long. The official surface consist of two mats (named Jonglobot in 2014) joined together by their red areas. The start (0 cm) and finish (488 cm) areas are white.
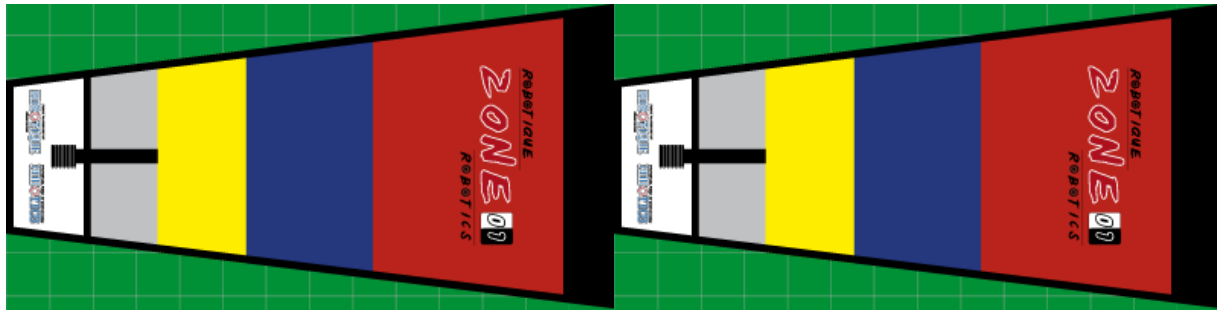
The first play mat is the launch surface, divided into two areas :
    1. the propulsion area
    2. the shot area
The second play mat and its colored areas will be the targets.

*Instead of purchasing a second mat, schools could also replicate the target areas using tape on the floor.

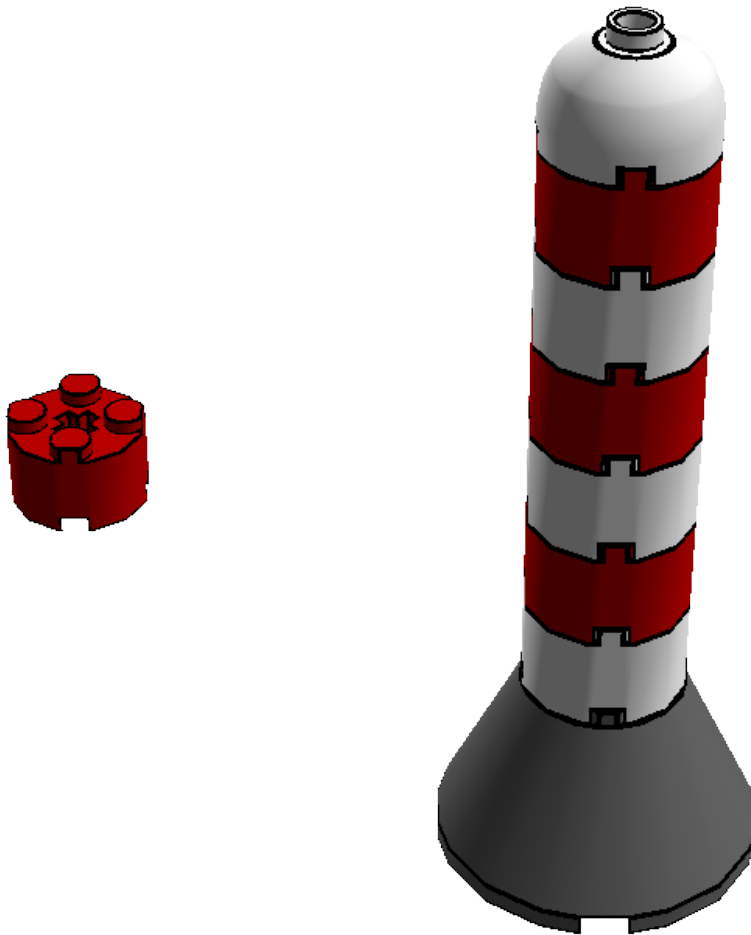## Play Mat Design

Accessories Description

a. Weight

The weight consists of a NAYA 500 ml liter bottle (full).

b. Basket

The weight (pushed or pulled) is to be deposited in a basket. Each team is free to build its own.

b. Rocket

The rocket will be made of LEGO blocks, as shown below. A building guide is provided.

Round Description

a. White Category

1. For this category, the weight consists of a NAYA 500 ml liter bottle(full).
2. The team place its robot in the starting (grey and white) area;
3. The weight is deposited by a student in the white area BEHIND the robot, in the basket designed by the team.
4. At the judge's signal, the robot is activated to perform its tasks.
5. The robot must carry/tow/move the weight to the propulsion (blue and yellow) areas.
6. It must then leave/dispose of the weights at the junction between the blue and yellow areas.
7. Once the weight has been dropped, the robot then moves to the end of the mat (red area) to launch the rocket towards the other mat.
8. NOTE: The robot's wheels (or any of its parts) must not touch the black area.
9. The rocket landing point determines the score : the farthest it is from the launching area, the more points a team can get. The white area is the smallest and farthest, and therefore the limit not to exceed. Otherwise, the orbiter will be lost, and the astronauts to join too!

Points will be given for :

NO	Masse			Fusée						Temps	Total
	Zone Jaune	Entre Jaune-Bleu	Zone Bleue	Zone Noire	Zone Rouge	Zone Bleue	Zone Jaune	Zone Grise	Zone Blanche		
	/ 6	/ 10	/ 6	/ 6	/ 8	/ 10	/ 12	/ 15	/ 20		max 30

https://docs.google.com/drawings/d/1HCwI2wwQeoiN5cHsuAHma64I-wpP4zep-0xoiGseFmU/pub?w=953&h=174

b. Black Category

1. For this category, the weight consists of TWO to SIX 1 liter water bottles.
2. The team place its robot in the starting (grey and white) area;
3. The weight is deposited by a student in the white area BEHIND the robot, in the basket designed by the team.
4. At the judge's signal, the robot is activated to perform its tasks.
5. The robot must carry/tow/move the weight to the propulsion (blue and yellow) areas.
6. It must then leave/dispose of the weights at the junction between the blue and yellow areas.
7. Once the weight has been dropped, the robot then moves to the end of the mat (red area) to launch the rocket towards the other mat.
8. NOTE: The robot's wheels (or any of its parts) must not touch the black area.
9. The rocket landing point determines the score : the farthest it is from the launching area, the more points a team can get. The white area is the smallest and farthest, and therefore the limit not to exceed. Otherwise, the orbiter will be lost, and the astronauts to join too!

Points Table

NO	Masse			Nbre masse	Fusée						Temps	Total
	Zone Jaune	Entre Jaune-Bleu	Zone Bleue	x nbre bouteille	Zone Noire	Zone Rouge	Zone Bleue	Zone Jaune	Zone Grise	Zone Blanche		
	/ 6	/ 10	/ 6		/ 0	/ 0	/ 10	/ 15	/ 25	/ 30		max 90

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Questions/Answers

As the season progresses, questions and clarifications will be made to the challenges. Do not forget to check out the FAQ section on the website.

For Teachers

Curriculum Standards
- Measure
- Force and motion
- Traction and gears
- Simples machines
- Gravity
- Effects of one or multiple forces on the direction of an object

Detailed Standards

Material World
Identify situations involving the force of friction (pushing on an object, sliding an object, rolling an object)
Identify examples of a force (e.g. pulling, pushing, throwing, squeezing, stretching)
Describes the effects of a force on an object (e.g. Sets it in motion, change its motion, stops it)
Describes the effects of a force on a material or structure
Predicts the combined effect of several forces on an object at rest or an object moving in a straight line (e.g. reinforcement, opposition)

Earth and Space
Recognizes the influence and the impact of technologies related to the Earth, the atmosphere and outer space on people's way of life and surroundings (e.g. prospecting equipment, meteorological instruments, seismograph, telescope, satellite, space station)
http://fr.wikipedia.org/wiki/Atmosph%C3%A8re_terrestre

In-class Discussion

Assessment Suggestions
Ask your students to document all the stages of their preparation.
Use Evernote to keep track of their work.

Documents to download
Configuring my NXT/EV3

Tutorials

J3 - 3-2-1 TAKE OFF, Junior Challenge

How to build a catapult
How to detect colors

The Space Walk

Learning Situation

During the Perseids, the space station met with many meteors in orbit and was damaged. In order to repair the damage, we must first remove the pieces of rocks lodged within the space station. The external environment is still too dangerous for astronauts. So how should we proceed? Perhaps a robot moving on a rail could, hopefully, accomplish the various tasks.

Level of difficulty
Programming: ⅓
Design: ⅔

Overall Function of the Robot

Participants must build and program a robot to detect different objects that are distributed along the rail (beam). Then the robot will have to remove these objects and dispose of them in the specially marked area. This setup will allow the robot to have access to parts of the space station that were damaged. Participants must make their robots do several back and forth trips along the beam.

Robot Description

The size of robots participating in this challenge must not exceed the following limits:

   A. Length at the start: 30.48 cm (or 1 foot)
   B. Height: no limit
   C. Width: no limit
   D. Weight: no limit

The robot will be moving along the beam. The robot can be fitted with an arm, a clamp and a distance sensor as needed. The robot MUST be in contact with the beam at all time and may at any time be touching the ground.

Surface Description

The field on which the robot operates is a sheet of plywood 121.5 cm by 243.8 cm (4' x 8') covered by the printed playing mat which a wooden plank separates? the center along it's length. The plank is 8.9 cm tall x 3.8 cm wide x 243.8 cm length, commonly known as an 8' long 2'x4'

WARNING: Unlike last year, the plank is placed DIRECTLY ON the center of the playing mat. The mat is secured to the table with velcro.
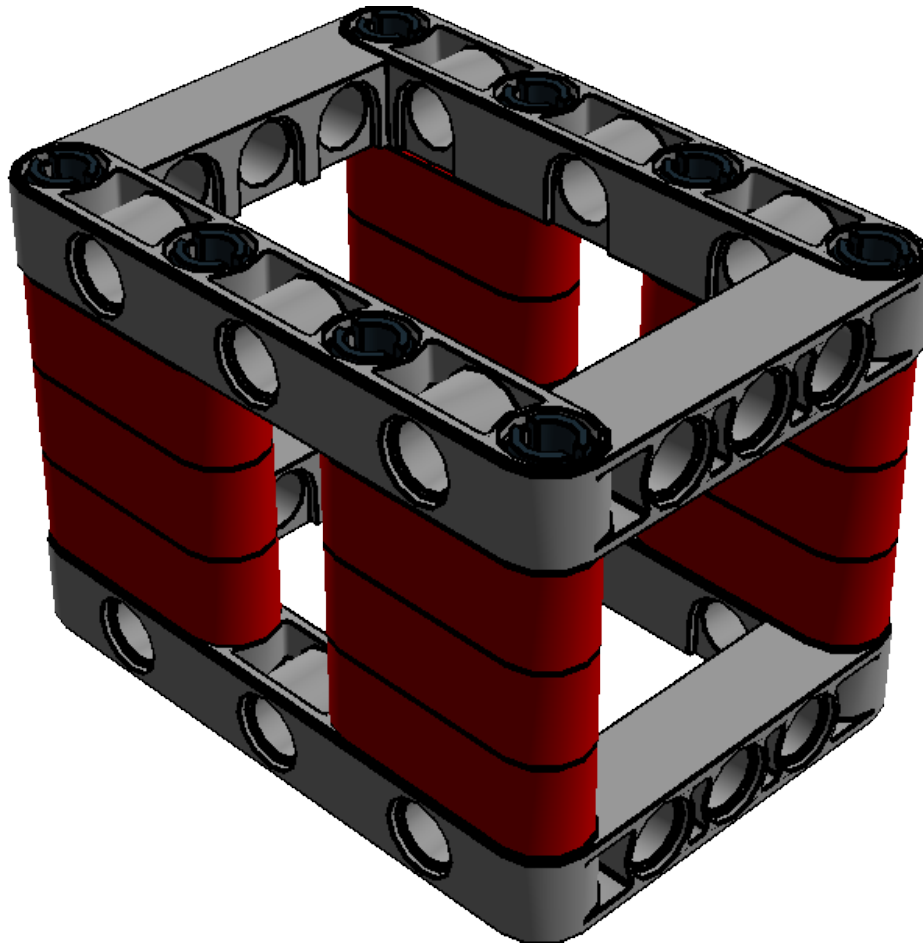
Playing Mat Used

http://www.zone01.ca/images/stories/2014/tapis/2014-tapis-poutre-jr-sr-v3.png
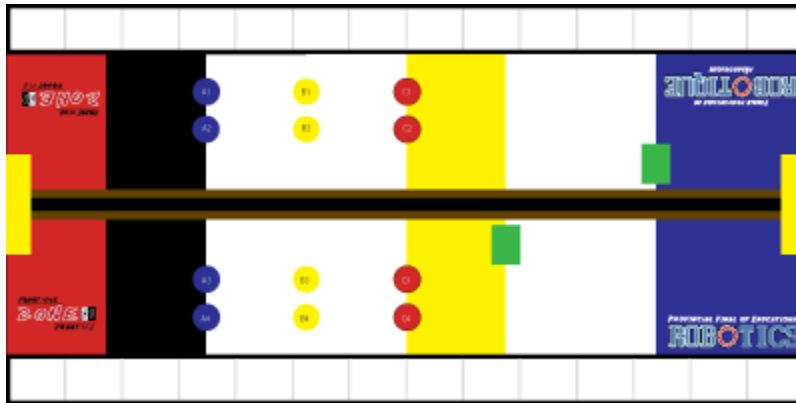
Description of accessories
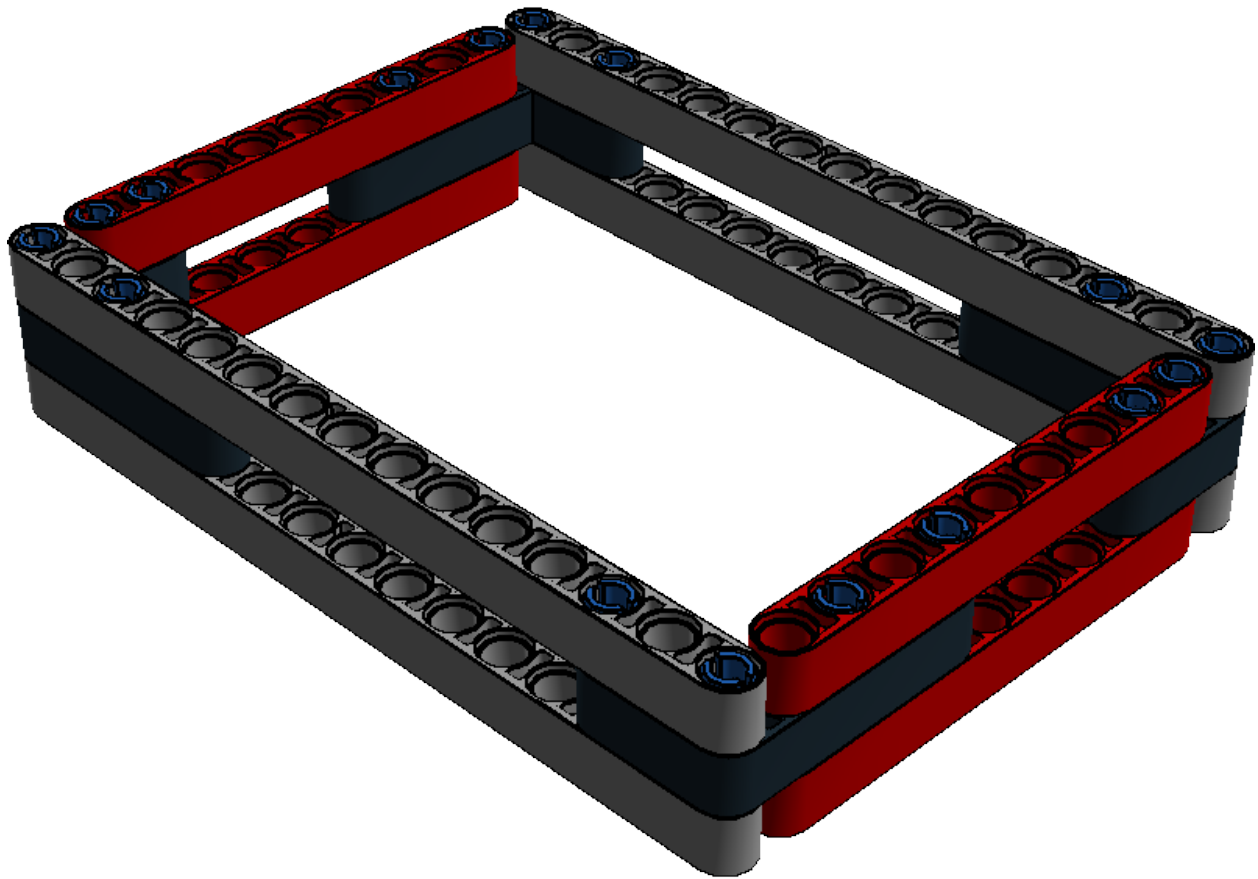
a. The objects from the white category

The colors are not important here.

b. The objects from the black category

c. The basket form the black category

Plans de montages disponibles sur www.zone01.ca

Designs to build the structures are available at www.zone01.ca

Description of one round

Time allowed to solve the challenge: 5 min

a. White Category

1. 3 objects (rocks) of the same type are placed around the beam at predetermined positions which are indentified as either A2, B2 or C2 (see playing mat)
2. The robot is placed in the starting area (a red zone at one end of the beam) which needs to search the first rock (cube 1). In this category, search can also mean push, bump or pull.

3. Once this rock is found and captured, it must be deposited into the green square symbolizing the basket which is at the extreme end of the beam.
4. The robot has to repeat the same operation with the other two objects (cubes 2 and 3).

The Points Table

Points will be awarded for:

NO	Roche 1				Roche 2				Roche 3				Temps	Total
	Prise	Panier manqué	ou	Panier	Prise	Panier manqué	ou	Panier	Prise	Panier manqué	ou	Panier		
	/ 4	/ 4		/ 6	/ 4	/ 4		/ 6	/ 4	/ 4		/ 6		max 30

No.	Rock 1	Rock 2	Rock 3	Time	Total
	Trial\n\nMissing basket\n\nOr\n\nBasket				

https://docs.google.com/drawings/d/155aNvGr1tROowWQbt07PlRLUM3f60d7yCztTTIofxuE/pub?w=953&h=174

b. Black Category
1. 1 object is placed ON the beam at a random place
2. 3 level (rocks) of different types are arranged around the beam at RANDOM positions (either A2 or A3, either B2 or B3, either C2 or C3)
3. The robot is placed in the starting area (a red zone at the one end of the beam) and it needs to search and capture the first rock (cube 1).
4. Once this rock is captured, it must be brought into the basket at the other end of the beam.
5. The robot has to repeat the routine with the other three objects (cubes 2, 3 and 4).

The Points Table
Points will be awarded for:

NO	Roche 1				Roche 2				Roche 3				Roche 4				Temps	Total
	Prise	Panier manqué	ou	Panier	Prise	Panier manqué	ou	Panier	Prise	Panier manqué	ou	Panier	Prise	Panier manqué	ou	Panier		
	/ 4	/ 4		/ 6	/ 4	/ 4		/ 6	/ 4	/ 4		/ 6	/ 6	/ 6		/ 9		max 45

No.	Rock 1	Rock 2	Rock 3	Time	Total
	Trial Missing basket Or Basket				

https://docs.google.com/drawings/d/1tQESU_-vOrHDiiQ5iwZ1BfnTLhAdXdbiKoitjhV3hRs/pub?w=1369&h=265

Questions and Answers

As the season gradually progresses, details will be made to the challenges. Do not forget to check out the "FAQ" section on the website.

J3 Dangerous satellite

Accepted Robotic Systems are Mindstorms RCX, NXT and EV3.

ATTENTION: NEW THIS YEAR
There is now 2 categories for this challenge.

Setting the Scene

There are too many satellites now in low orbit, the satellite Closing stocks is now defective and collisions are more then numerous. The New satellites have to defend themselves, otherwise they will be put on another orbit . You must programmer your satellite to eject other satellite on another orbit without damaging it.

Difficulty level

Programming : 2/3
Design : 2/3
Strategy: 2/3

General function of the robot

Participants must build and program a robot that is able to:

- detect the white border on the circular edge of the playing field;
- detect the opponent's robot;
- push or pull (force) the opponent's robot COMPLETELY outside the circular playing field without going out yourself.

Description of the robot

WHITE Category

The robots that participate in this challenge must not exceed the following limits:
1. Weight: 1 kg (1000 g)
2. Lenght at all time : 30 cm
3. Height : no limit
4. Width at all time : 30 cm
5. 3 motors maximum

BLACK Category

The robots that participate in this challenge must not exceed the following limits:
1. **Weight: 1,25 kg (1250 g)**

J3 - Dangerous satellite, Junior Challenge

2. Lenght at all time : 30 cm
3. Height : no limit
4. Width at all time : 30 cm
5. **4 motors maximum and 2 controllers allowed**

NO LEGO PIECE can be modified in anyway (cutting, filing, folding, etc.)

NOTICE
The robots need to function autonomously. No telecommunications, ipod, ipad or any other similar devices are permitted near the arena.

The following elements of a robot are NOT ALLOWED in a round:

● Any materials or parts whose purpose is to "attack." For example, programming a robot to break pieces, deploying a part, swinging an arm, etc.
● The goal of the challenge is to push and not to break your opponents robot (A robot will not be disqualified if small parts detach or fall off accidently, provided that, it is not the intention of the opposing robot).
● Parts of the structures of a robot that can be extended.
● External objects that can be projected.
● Check the guide in the general rules.

ATTENTION: NEW THIS YEAR

ONLY the wheels of the robot can touch the ground. All the other parts of the robot must be off the ground. There needs to be a space equivalent to the thickness of a LEGO piece between any part of the robot and the ground. Any pieces or parts, other than the wheels, touching the ground must be removed or adjusted.

The following elements of a robot are ALLOWED in a round:

● Defence structures such as bumpers, ramps, etc.
● LEGO elastics or elastics with model no. 3031507, 64mm x 1.5mm

Other elements necessary for this challenge

- Light sensor(s) and/or colour sensor(s)

Description of the playing field

The playing field is a black, circular area (mat) 1 meter in diameter bordered by a 2 cm white stripe. In the center of the playing field, there are two gray parallel lines placed 10 cm apart. These lines represent imaginary lines extending to the edges of the circlular playing field.

At the beginning of the round, the robot of each team must place their robot directly in the center of the arena behind the gray line. THE LEFT OR RIGHT SIDE OF THE ROBOT MUST TOUCH THE GRAY LINE.

Diagram of playing field

Match Procedure

Each team will compete in 3 rounds against the same opponent in the same match. If they choose, a team may change their program for each round. A match lasts a maximun of 3 minutes.

Round Procedure

- Only one member of each team may approach the playing field.
- When the two teams present themselves, the robots must be inspected by a judge.
- Prior to the start of the round, the robots will be weighed using an electronic scale and placed in a 30 cm x 30 cm box to ensure that each robot complies with the rules of the challenge.
- At a signal given by the judge, each team can activate the program on their robot.
- There must be a 5 second delay before the robot starts moving. This delay is necessary to enable the participants to move back, away from the playing field.
- Each robot must move in reverse and in a straight line parallel to the gray line of the playing field, and then, it must detect the white border on the edge of the playing field behind its gray line. Once this white border is detected, the robot must display a light and a message on the screen. The robot can then begin to seek the opposing robot and push or pull (force) it out of the playing field.
- A robot cannot be touched once the round starts. However, the judge may demand to replay or restart the round of a match. If so, the designated participant of each team can retrieve his/her robot, stop the program and, at the signal of the judge, reposition the robot behind the gray line.
- At the signal of the judge, the same designated member of the team restarts the same robot program. The stopwatch of the judge will be stopped during the preparations of a new replay or restart of the match; however, no robot may leave the playing area.

10. More Details

False Start
- Not complying with the 5-second delay at the beginning of the round
- A robot begins the round before the signal of the judge

The judge may start a NEW ROUND WHEN one of the following situations occur:
- A robot COMPLETELY leaves the playing field (2 points for the opposing team)
- A second "false start" for the same team (2 points for the opposing team)
- A student touches one of the robots in the playing field (2 points for the opposing team)
- The robots are tangled, or stuck to each other for more than 10 seconds without any movement being observed (1 point for each team)
- When the robots exit the playing field at the same time (1 point for each team)
- The robots stop at the same time and remain motionless without touching each other for more than 10 seconds (1 point for each team)

The penalties:
- A second "false start" for the same team (2 points for the opposing team)
- A student touches one of the robots in the playing field (2 points for the opposing team)

The points

A team may accumulate a maximum of 3 points per round for a total of 9 points for one match. A point(s) is awarded when:

- At the beginning of a round, the robot touches the white border of the playing field AND displays a light and a message on the screen. Each team can earn 1 point.
- The robot of a team is successful in forcing the robot of the opposing team to COMPLETELY exit the black surface (playing field). The winning team will earn 2 points.
- A robot exits the black surface (playing field). The opposing team earns 2 points.
- A robot that is tilted on its side or upside down and remains stationary is considered eliminated. The opposing team will earn 2 points.
- A robot that is tilted on its side or upside down and continues to move is still considered in play.
- The robots are tangled, or stuck to each other for more than 10 seconds without any movement being observed. Each team earns 1 point.
- When the robots exit the playing field at the same time. Each team earns 1 point.
- The robots stop at the same time and remain motionless without touching each other for more than 10 seconds. Each team earns 1 point.
- An infraction of the rules is committed. The opposing team will earn 2 points and win the round.

WRO 2015

Regular Category

Elementary School

Game description, rules and scoring

PEARL DIVING

Contents

Game Description

The name of this year's elementary school regular category challenge is "Pearl Diving".

This year's theme, "Robot Explorers", encourages students to build robots that can investigate and explore different environments, some of them hostile to humans.

This game challenges you to build a robot that can dive and explore under the sea for pearls. For each dive you will only have 30 seconds before the robot needs to come back up for air.

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 large green 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 large green area. No part of the robot is allowed outside the large green area before it starts.
8. At the start of each round (post-quarantine), 9 colored LEGO cubes will be randomly selected and placed on the white squares. This will show the number of pearls found at each location. The positions of the colored cubes will be set for all participants in that particular round. The total sum of the cube color values will never exceed 12.

9. The robot's mission is to 'dive' into the water and determine the number of 'pearls' found in each of the three colored zones. The robot must determine the number of 'pearls' that each cube represents by its color. Each 'pearl' found is represented by one Ping-Pong ball. The sum of the 'pearls' found in a colored zone gives the total number of Ping-Pong balls the robot should deposit into the large colored area associated with that zone.

10. The color of each LEGO cube represents the following number of pearls:
    a. Blue Cube   = 0 pearls
    b. Green Cube   = 1 pearl
    c. Yellow Cube   = 2 pearls
    d. Red Cube   = 3 pearls

11. The colored LEGO blocks must be pushed into the small colored end zone below the white square where the block is found.
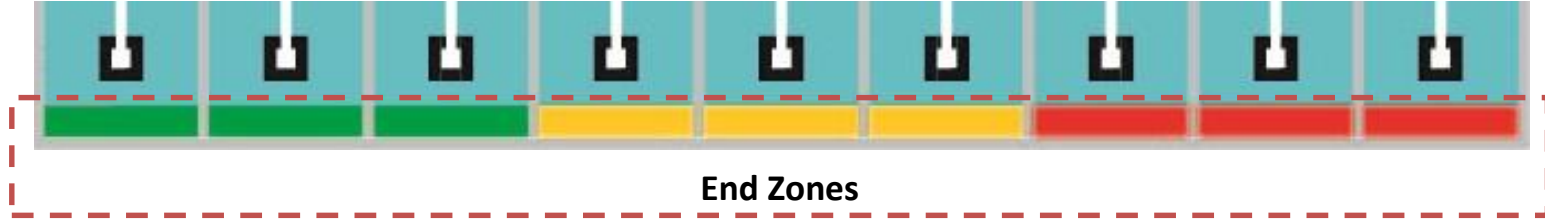
End Zones

12. To make sure the diver does not run out of air, the touch-pad in the large colored zones must be pressed to reset the 'oxygen' timer. If the timer goes to zero the attempt is immediately ended and the time for the attempt is recorded as 120s.

13. Up to 12 Ping-Pong balls are allowed to be loaded onto the robot by participants before the robot starts. Ping-Pong balls are not allowed to be loaded after the robot has started.

14. If there is any uncertainty during the task, the judge makes the final decision. They will bias their decision to the worst outcome available for the context of the situation.

15. 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. The 30 second timer expires (the robot runs out of air).
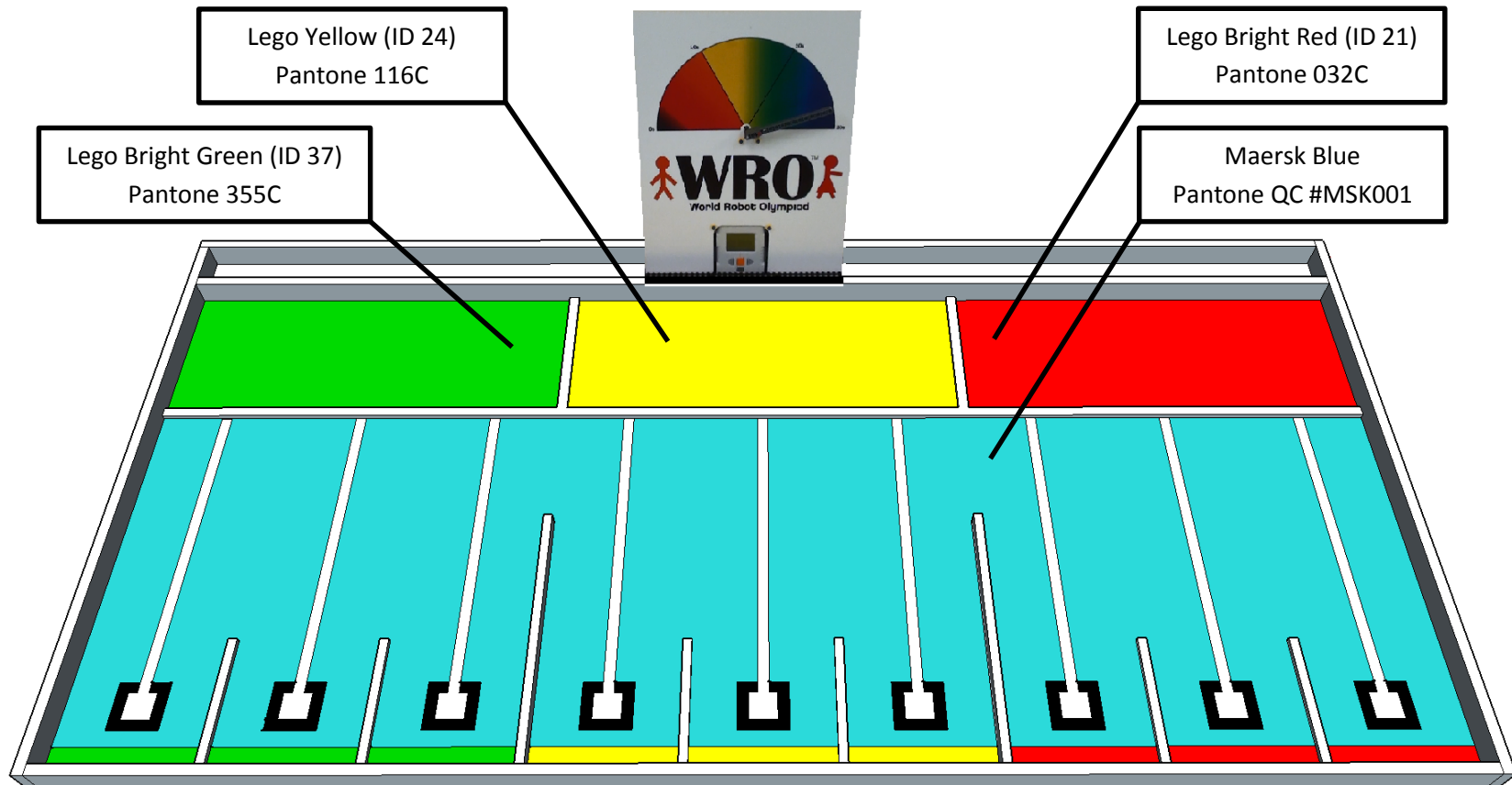   e. Violation of the rules and regulations within.

Scoring

1. Score will only be calculated at the end of the challenge or when time stops.
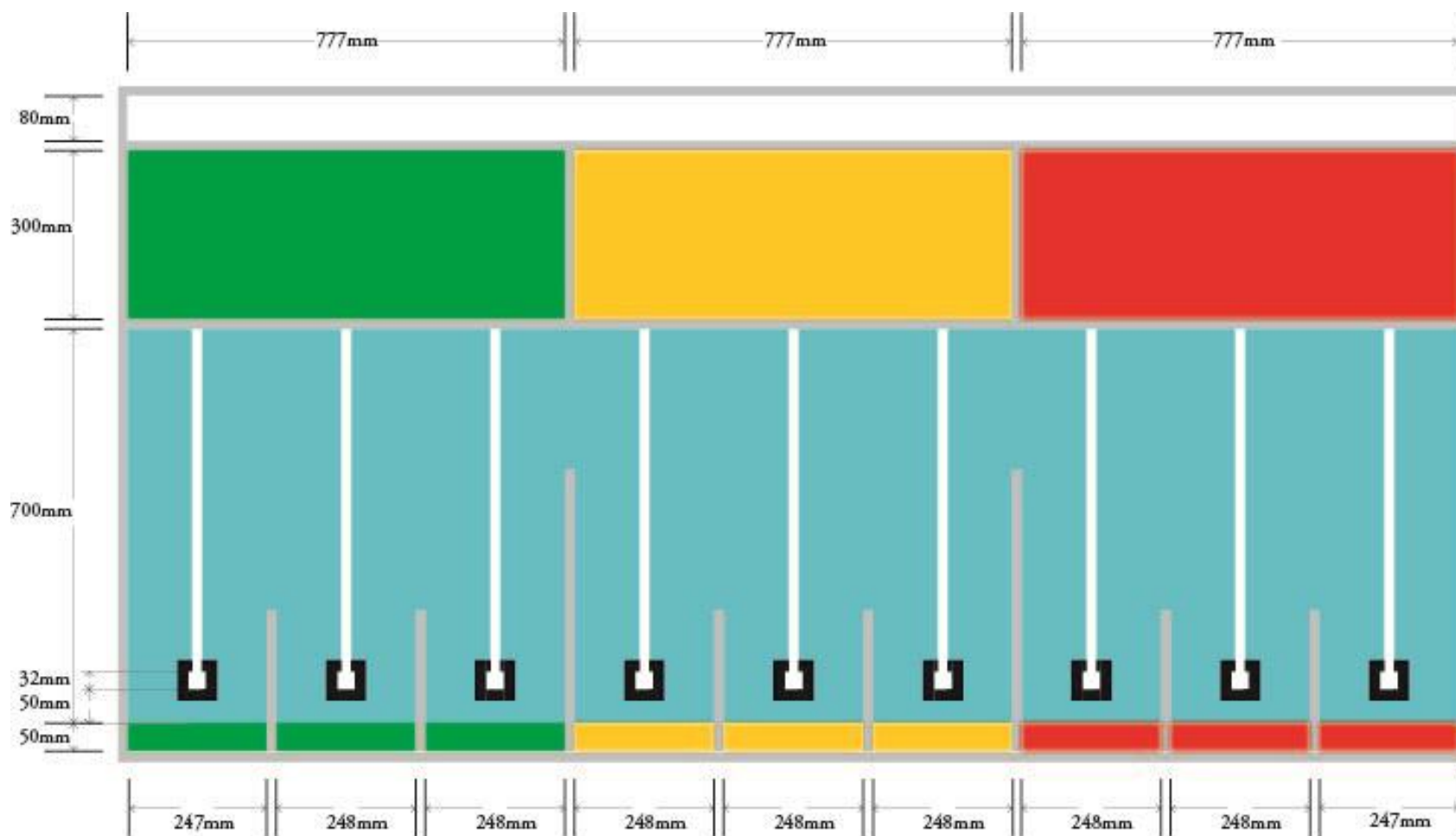2. Every colored LEGO block pushed into the small colored end zone below = 5 points.
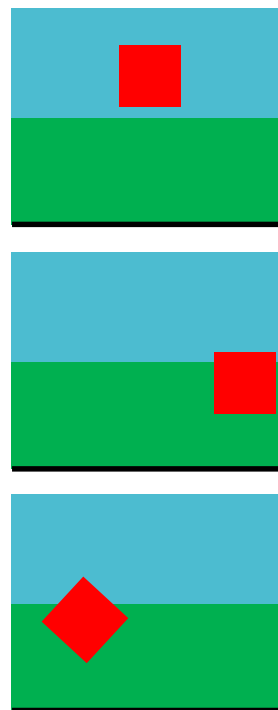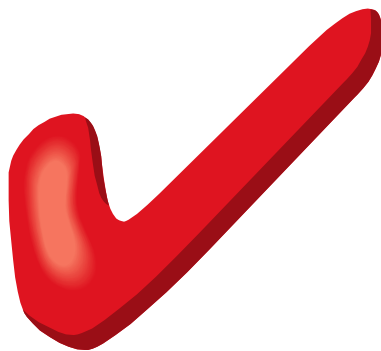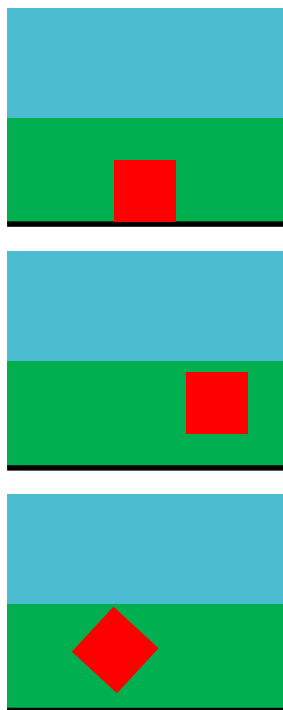
3. For each of the large colored areas, the correct number of ping pong balls present in the area = 15 points.
4. Robot finishes in the large red area = 10 points.
5. Maximum score = 100 points. Breakdown:
   a. 45 points (9 colored LEGO cubes pushed to their end zones x 5 points).
   b. 45 points (3 large colored areas with correct number of Ping-Pong balls x 15 points)
   c. 10 points (robot finishes in large red zone)
6. If teams have the same score, ranking is decided by the fastest time recorded.
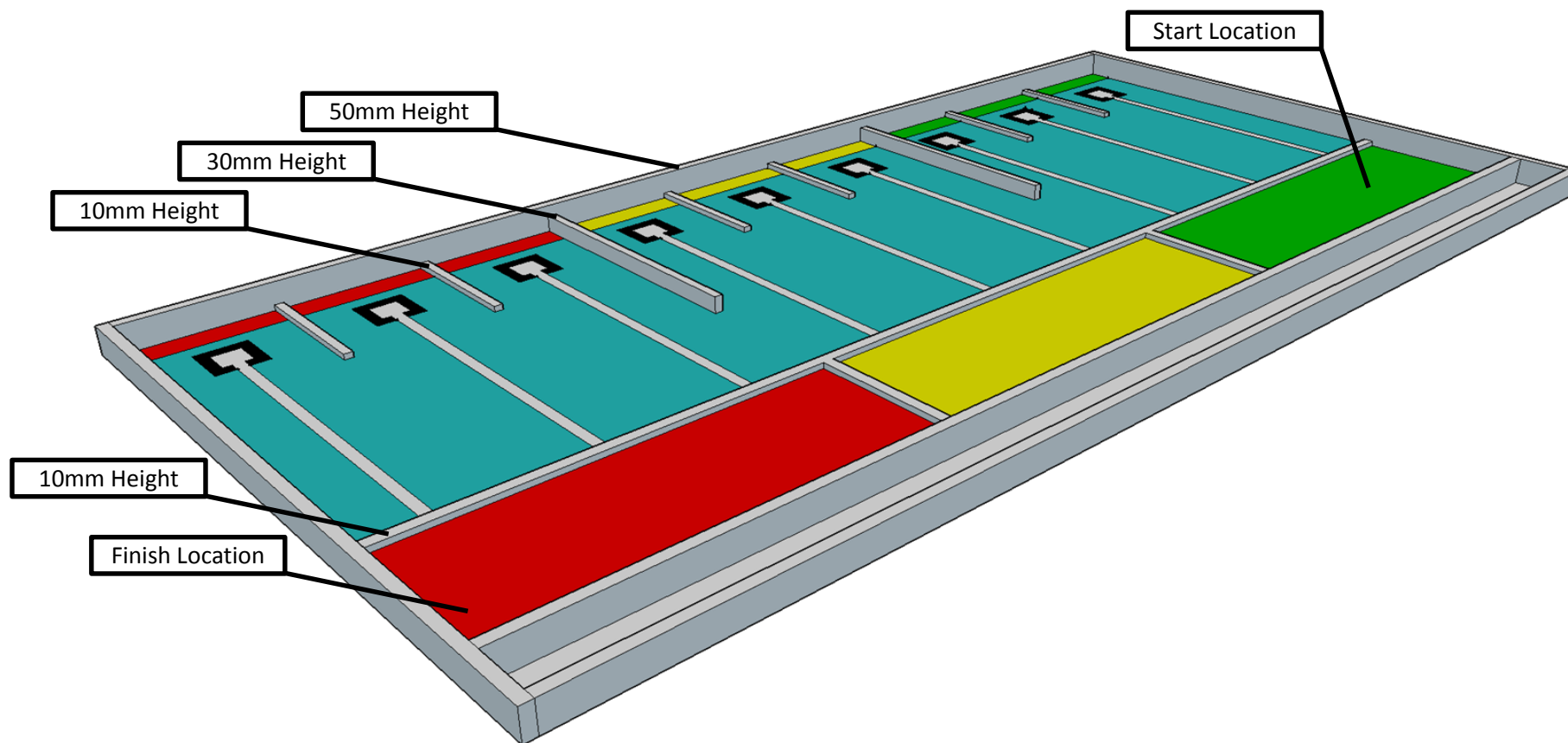
Game Table in 3D

Lego Yellow (ID 24)
Pantone 116C

Lego Bright Red (ID 21)
Pantone 032C

Lego Bright Green (ID 37)
Pantone 355C

Maersk Blue
Pantone QC #MSK001

Table specifications I

All grey walls 17mm, All white and black lines 20mm
Outside dimensions 2400mm x 1200mm

Table Specifications II

Start Location

50mm Height

30mm Height

10mm Height

10mm Height

Finish Location

The edges of the table and the divider beside the timer are 50mm in height. The large 'underwater' dividers that separate the colors are 30mm in height. The small 'underwater' dividers and the dividers around the large colored areas are 10mm in height.

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Table Specification III

1. The size of the game table is 2400mm x 1200mm.

2. The game table has a closed off area 80mm x 2400mm. This area is used for the timer mechanism.

3. The walls around the three large colored areas are 10mm high and 17mm thick.

4. The walls separating small colored areas of the same color are 10mm high and 17mm thick.

5. The walls separating the small colored areas of different colors are 30mm high and 17mm thick.

6. The small colored areas are 248mm x 50mm, except the two end blocks which are 247mm x 50mm.

7. The white lines extending from the large colored blocks to the small colored blocks are 20mm x 650mm.

8. The white box along the white line is 32mm x 32mm, and is positioned 100mm from the wall (50mm from the colored block).

9. For challenge objects, 12 Ping-Pong balls with a diameter of 40mm each will be used to represent pearls.

10. Blocks made of regular 2X4 LEGO bricks will be placed on the white squares. These represent the number of pearls found in a given location.
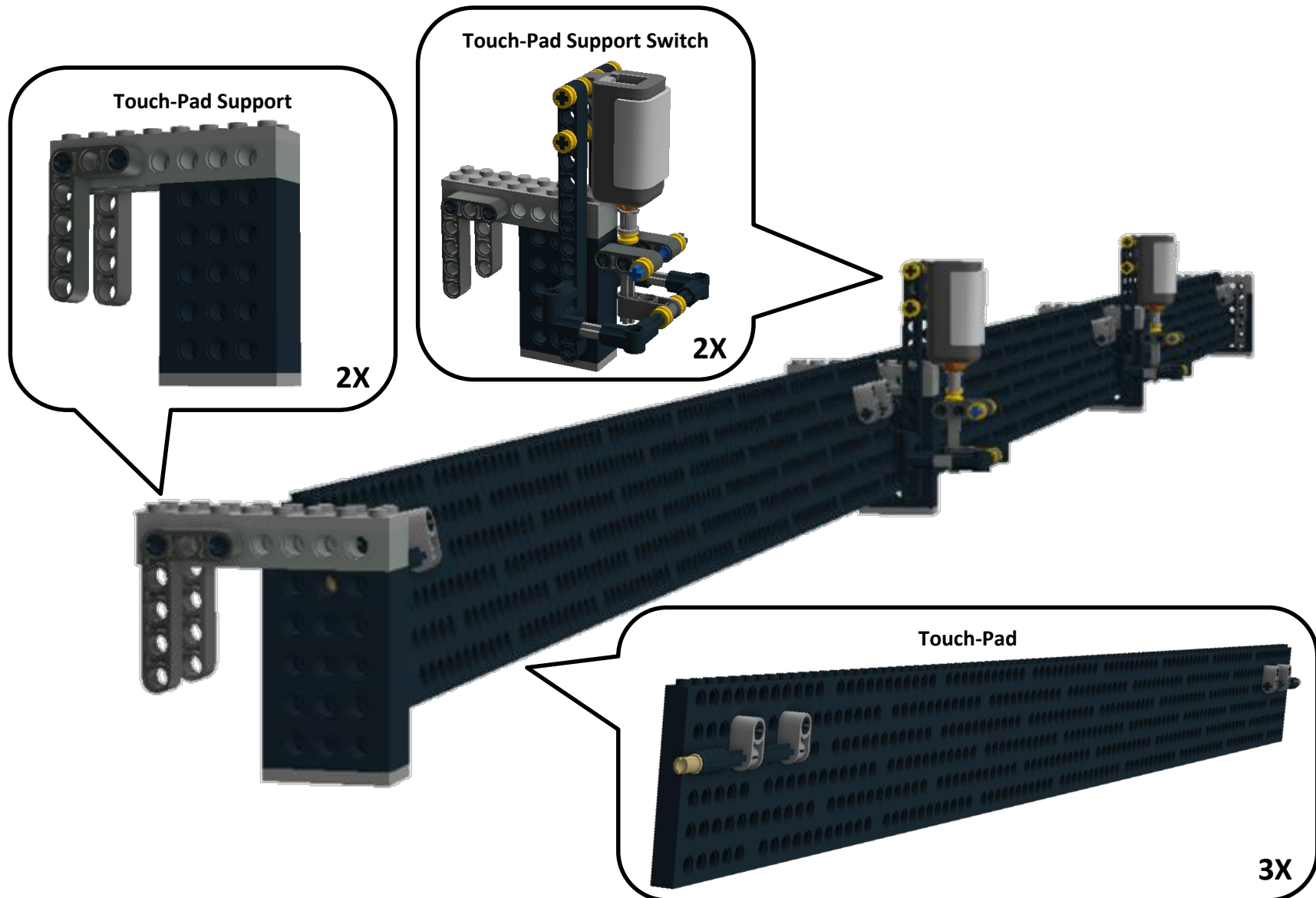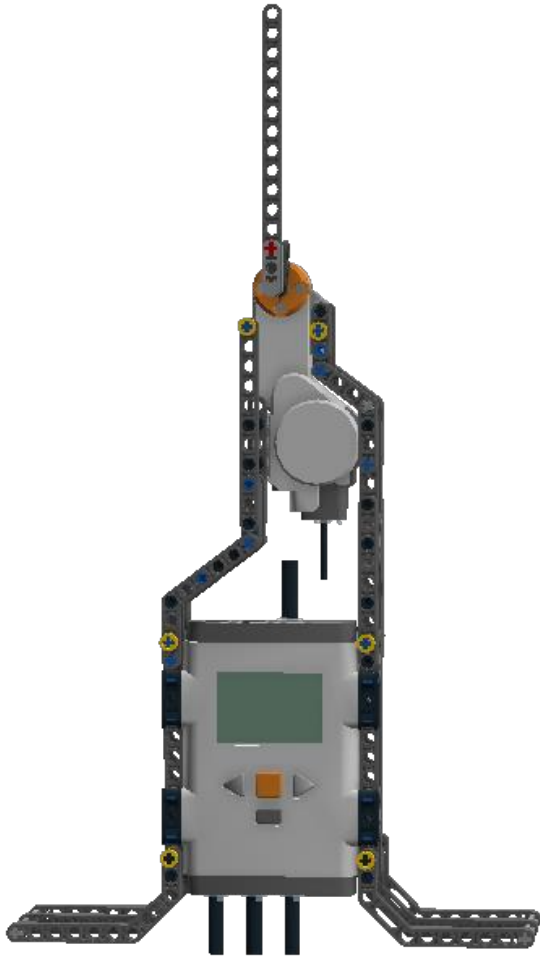
Table Object Specifications

6x 300121

6x 300137

6x 300123

6x 300124
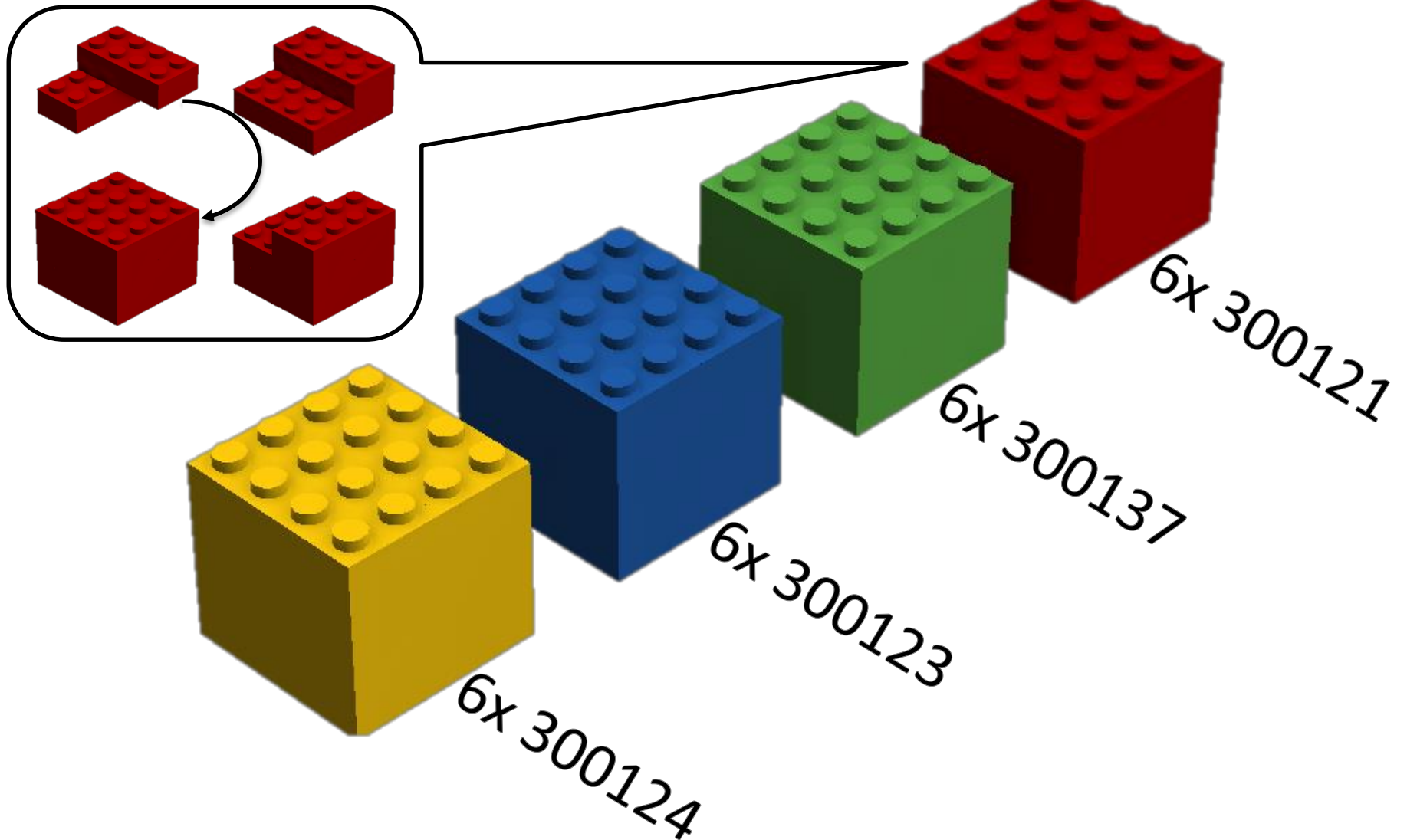
NOTE: A maximum of 4 Red, 7 Green, 5 Blue, and 5 Yellow cubes may be required.

(It's recommended that 4 Red, 7 Green, 5 blue, 5 Yellow *of each color be made per table)*

Dive Time Clock Specifications

Touch-Pad Support

2X

Touch-Pad Support Switch

2X

Touch-Pad

3X

Dive Time Clock Mechanism

Dive Time Clock – Challenge Reset Button

Color Specifications

Color Name	Lego Color ID	Pantone	CMYK				RGB			RGB Sample
			C	M	Y	K	R	G	B	
Bright Red	21	032C	0	100	100	0	196	40	27	
Bright Blue	23	293C	100	47	0	0	13	105	171	
Bright Yellow	24	116C	0	19	100	0	245	205	47	
Bright Green	37	355C	88	0	100	0	75	151	74	
Redish Brown	192	499C	32	80	95	50	105	64	39	
Maersk Blue		QC #MSK001	62	2	15	2	76	188	208	

More Accurate ———————————————————————→ *Less Accurate*

Appendix A – Alternative rules suggestions

Some country organizers may wish to modify the game rules to simplify table construction or to eliminate the automatic air timer. Here are a few suggestions.

1) Instead of using the timer mechanism described, an assistant judge can be tasked with monitoring the time that a robot is under the water using a stopwatch. We recommend that the timer should be reset when the robot touches the edge of the game table, which will be as similar as possible to the world finals game table where the robot must press the timer mechanism to reset the clock.

2) If a flat printed mat is desired with no walls (to simplify table construction), the balls will likely not stay in the area where they are dropped as they will be free to roll around the table. We recommend that the number of balls placed in a zone is calculated based on where the ball first touches the table surface. An assistant judge could be responsible for recording the number of balls that land in each zone instead of counting the number in each zone at the end of the mission.