

**WER (World Educational Robot) World
Championships 2016**

**Brick Robot Contest
Rules**

**2016 Season
Theme: Move the Earth**

**Federation of World Educational Robot
Sept. 10, 2016**

I . Preface

“Give me a place to stand on, and I will move the Earth.” —Archimedes

II. Matters Need Attention

1.1 Equipment Preparation

The robotics kits are prepared by the contestants themselves; arena and task models are prepared by the host. There will be local power outlets around the arena. Contestants need to bring long extension cords (no shorter than 2 m) as there will be some practice desks that are far from the power sockets. And always, please secure the plug and be careful while using the electricity.

2.2 Dimensions

- Dimensions: Before starting, the dimensions of the robot should be no more than 30*30*30cm (length*width*height). After leaving the base, the robot can change its dimensions.
- Controller: Only one controller is allowed to be used for each robot. And the controller is not allowed to be changed during one single round.
- Actuator: When the motor is used for driving wheels, only one motor is allowed to drive one wheel. Every robot is allowed to have at most 4 motors.
- Sensors: The sensor type and number of sensors that can be used on a robot is unlimited, while integrated sensor that made by multiple same sensors or different sensor probes is not allowed to be used.
- Structure: The robot can only be built by connecting the plastic parts themselves. No ribbons, screws, rivets, glues, tapes etc. are allowed to be used for connecting.
- Power: The robot must be powered by a battery. External power sources are not allowed. Voltage of the battery should be no more than 9V. External circuit board (for step up/step down/ stabilize voltage) is also not allowed.

There will be a spot check on the robot dimension during the debugging period. The robot may be forbidden to enter the arena if violation of regulation is found.

2.3 Arena Environment

The type and amount of light in the arena will not be known until the contest day. Before the contest starts, there will be time for participants to adjust the sensors. However, light on the arena may change as time goes by. Flashes from camera or other unknown light sources could happen during the contest. Participants need to take this into consideration.

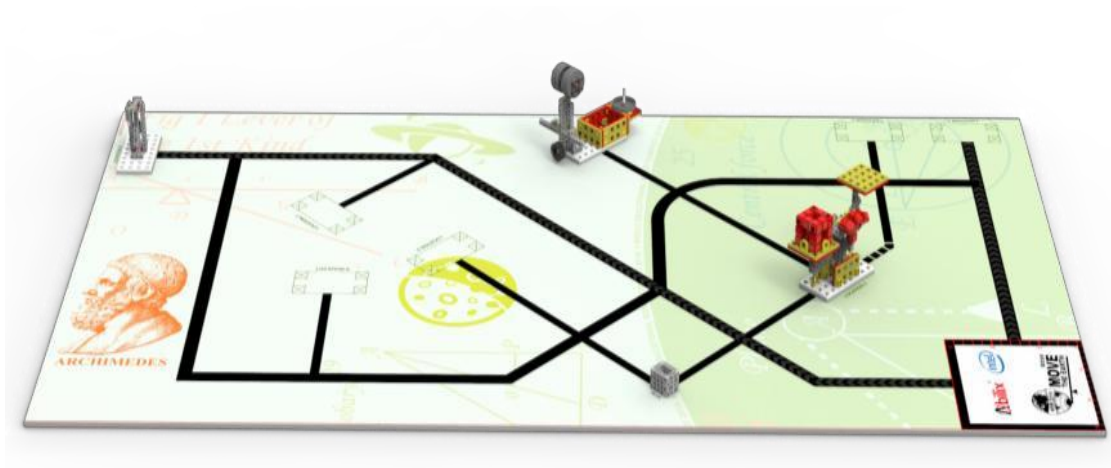
2.4 Divisions & Awards

The standard divisions are primary division, junior high division and senior high division. If there is less than 8 teams in the junior high or senior high division, the junior high and senior high divisions will be merged as middle and high division.

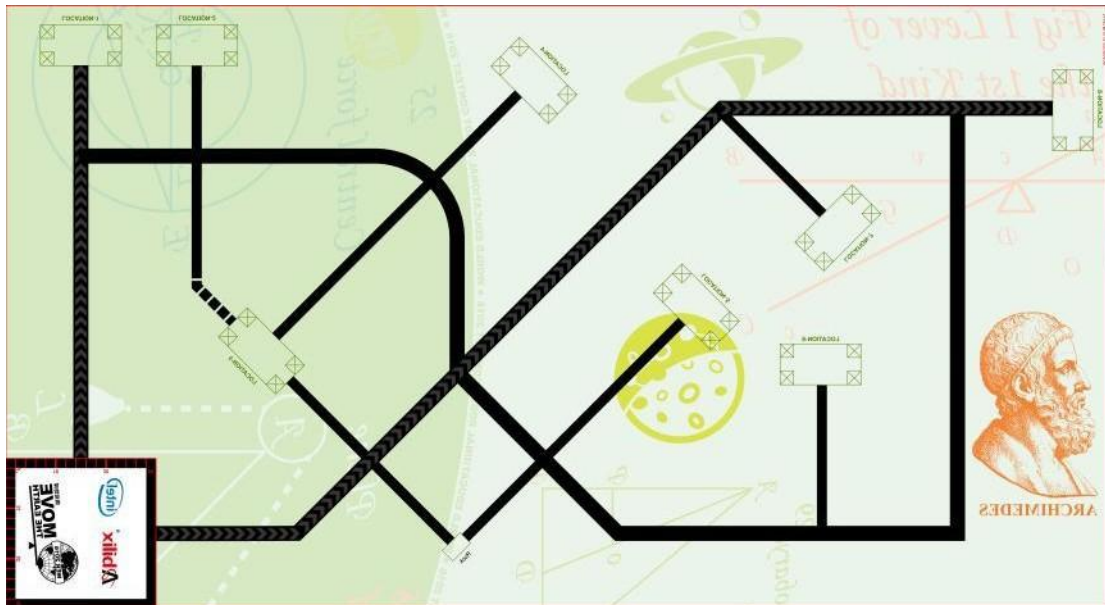
Each team has its own championships, runner up and third place. Other teams will be awarded first prize, second prize and third prize.

And there is scholarship that comes with the championship, runner up and third place.

III. Task Rules



3.1 Arena Map



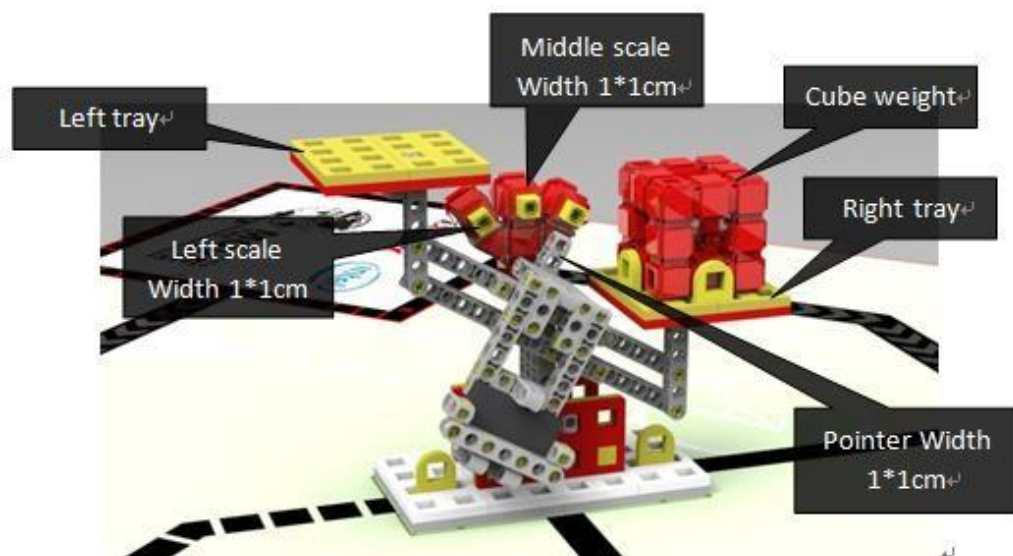
Length*Width: 220*120 cm; Base: 30*30 cm ; Material: PU Fabric

The width of the black line on the arena is 2-3 cm, and the wireframes at the end of the line are where the models are placed. The bottom left corner in the figure is called “Base” , whose size is 30*30cm.

3.2 Tasks

The tasks are divided into preset and secret tasks. There are 4 preset tasks in total, and the highest score of each is 10 points; the rules of which will be released with other rules. There are 3 secret tasks, and the highest score of each is 20 points; the rules of which will be issued on site. The position and orientation of the preset tasks will be issued on site unless otherwise stated.

3.2.1 Weight Control



Initial Status: A cube weight is placed on the right of the balance, with the pointer pointing to the right scale.

Task Requirement: contestants build a weight by themselves and put them on the left tray with the robot. However, the robot can't touch the model or the weight and make sure the cube weight is on the right tray.

Scoring Criteria:

10points – pointer points to the middle scale.

6points – pointer points to the left middle of the scale or the left scale.

Note: The standard for pointing to the certain scale is that the vertical projection of pointer's extending line casts on the dial scale.

3.2.2 Catapult

Initial Status: Counterweight reaches the highest position, with rubber ring closely hanging on the hook of the throwing arm.

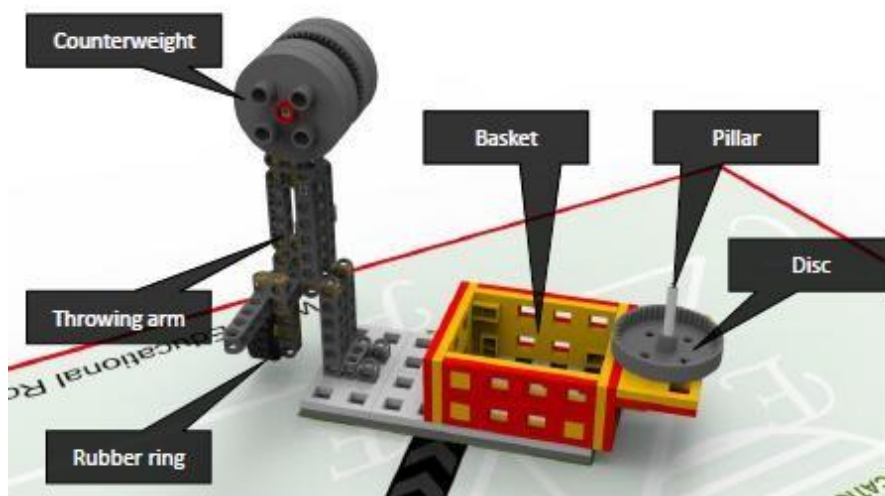
Task Requirement: The robot triggers the equipment and throw the rubber ring out.

Scoring Criteria:

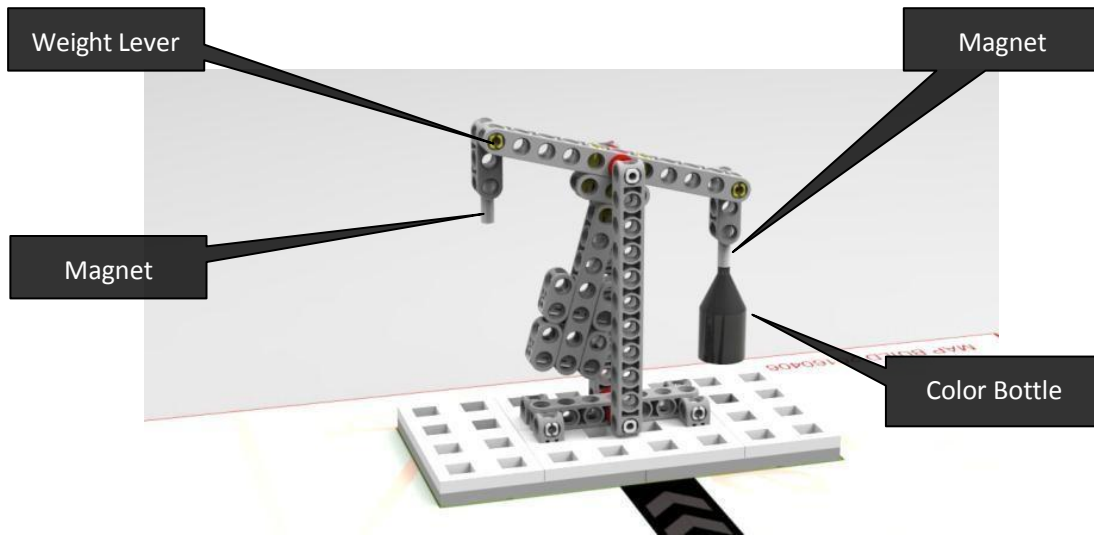
10 points – The rubber ring encircles or hangs on the pillar.

8 points – The rubber ring touches the disc, and the ring didn't encircle the pillar.

6 points – The rubber ring falls inside the box or on the box while didn't touch the disc.



3.2.3 Game of Balance



Initial Status: The right magnet on the balance scale attracts one color bottle, with the left side empty, which makes the balance scale.

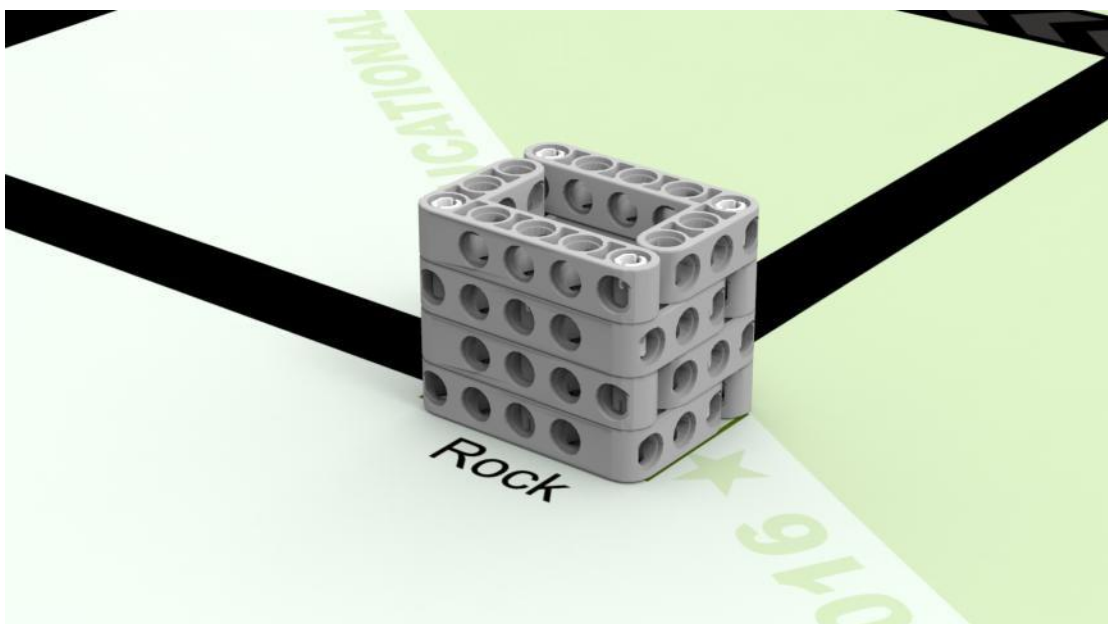
Task Requirement: The robot makes the color bottle to be attracted to the left side of the balance scale.

Scoring Criteria:

10 points – both the color bottles can be attached to the magnets.

Note: The color bottle that needs to be carried by the robot is put in the base or kept by the judges when the contest starts.

3.2.4 Moving Rock



Initial Status: The rock can only be put inside the designated wireframe.

Task Requirement: The robot needs to move the rock.

Scoring Criteria:

10 points – The rock enters the base or touch the base with its vertical projection.

6 points – The vertical projection of the rock is out of the wireframe but doesn't touch the base.

Note: The position of this model is fixed.

3.2.5 Secret Tasks

The secret tasks will be released when the contest starts. There will be some time for contestants to have their robot debugged.

Content released on site:

- a. the task models of the 3 on-site tasks (placed on the arena);
- b. the initial status and scoring criteria of the 3 on-site tasks (task description files);
- c. the layout and direction of the tasks (subject to the physical location)

IV. Competition Procedure

4.1 Check-in

Teams need to check in at the appointed location and reconfirm the sign-in info, and get the items supplied by the host. The team which didn't check in at the appointed time is considered as waiver, and the competition score will be -1 point.

The arena distribution condition and teams' order will be published on site.

When the check-in is done, teams are allowed to enter the arena to get familiar with the arena map and the environment light. However, by which time, there is no models on the arena. The teams also need to know where they are going to compete and debug.

4.2 Debugging

Teams enter the arena and sit according to the number. Each team will get a "Secret Task Description", which will declare the location and orientation of the task models.

The debugging time will be no less than 2 hours, during which, teams can prepare for the contest, design and revise the program and the robots' structure.

4.3 Mothballing robots

After debugging, the robot will be kept by the judge (battery excluded). Contestants are not allowed to touch the robot without permission; otherwise, their qualification will be removed.

4.4 Contest

Before the contest starts, each team will be given 2 mins to prepare, which include: robot preparation (not allowed to download the program again and change the controller) and arena confirmation (task model recovers to the initial status).

The competition lasts for 3 mins. The single round starts as the judge whistles and ends as the judge whistles again. Contestants can beckon the judge to terminate the competition in advance, however, contestants need to make sure the gesture can be understood by the judges.

When the competition finishes, contestants need to confirm the score sheet and sign the name. After which, contestants can leave the arena with the robot. **Please don't take the models away from the arena.**

4.5 Second Round

The competition is divided into 2 rounds, and each round involves debugging, mothballing and competition. If the task models in the second round is different from that of the first round, the arena layout is subject to that of the second round.

The competition area and order of the teams in the two rounds won't be changed.

V. Ranking

5.1 Deduction

Reboot: 5points/per time, robot needs to restart from the base.

During the competition, the robot will be requested to restart from the base if participants touch the robot outside the base.

If contestants retrieve the parts of the robot on the arena, the robot needs to restart. However, the robot can run normally.

When restart, the task models can be taken back to the base if they are on the robot, if not, the robot don't need to take them back to the base.

Violation: 5 points/per time, the team will be asked to rectified or be deprived the qualification.

If any team was found carrying communication equipment, it will be recorded as violation of the rule and the communication equipment will be confiscated. If the condition was considered as serious, the team will be deprived the competition qualification.

The Invalidation of the Task Models

If contestants touch the task models from outside the base, the models that have been touched will be taken as invalid, namely there is no points to be recorded based on the task models.

Score Cancellation

If any condition as below occurs, judges has the right to terminate the competition, the point of this round is 0. However, it won't influence the other round.

- a. Robots or contestants damage the arena in a malicious manner;
- b. Contestants interfere with the competition on purpose;
- c. Contestants offend the judges.

5.2 Scoring

When the competition is finished (3 mins is up/contestants give the signal to end the game), judges will score according to the task models. After that, contestants and judges sign their name to confirm the outcomes.

5.3 Ranking

The final score of the team is the sum scores of the two rounds.

The higher one team's final score is, the higher its rank will be.

When two teams' final scores are even, the one with less "RESTART" will get higher rank.

When times of "RESTART" are the same, the team spending less time in two rounds will rank higher.