NRC CoderZ Coding Challenge 2023
Primary, Secondary
CHALLENGE BOOKLET

Version: 09 March 2023

Organiser:

Sponsored by:

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Supported by:

NRC 2023 CODERZ CODING CHALLENGE
CHALLENGE BOOKLET CHANGE LOG

Version	Release Date	Description
1.0	10 March 2023	Official Challenge Booklet Release

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1. General Information

1.1. National Robotics Competition (NRC) 2023

National Robotics Competition (NRC) has been an ongoing competition organised annually by Science Centre Singapore for the past 24 years with support from the Ministry of Education, various partners and sponsors. This competition has attracted more than 62,500 participants and 250,000 supporters to date.

NRC spurs students' interest and innovation in Science, Technology, Engineering and Mathematics (STEM). Students will be able to put their knowledge to practice and engage in hands-on STEM learning. With NRC as a stage for students to develop kinaesthetic learning and collaboration, it encourages students to develop problem solving skills, entrepreneurial skills, creative thinking skills and team spirit among the participants.

This year, NRC marks its 25th Anniversary and it promises to be filled with exciting challenges that will ensure a fun and meaningful learning experience for the participants. NRC is also an excellent opportunity for students to interact with their peers, teachers and judges from the various industries during the course of the competition.

NRC 2023 tournaments comprise:

- NRC Regular Category
- NRC Open Category
- NRC AI Maker Series
- NRC Preschool
  - Kubo Challenge
  - ARTec Challenge **NEW*
- **NRC CoderZ Coding Challenge**
- NRC RoboCup Singapore CoSpace Coding Challenges **NEW*
  - Autonomous Driving Category
  - Rescue Category

Registration for these category challenges will be via https://www.gevme.com/NRC2023. Competition registration opens from **24 February to 1 July 2023.**

Note: Registration will be on a first come, first serve basis. If the category is full, your registration will be rejected and refunded.

1.2. Theme For NRC 2023

Every year, NRC revolves around a specific theme and this year, the theme for NRC is "**Sustainable Solutions**". Climate change is a global challenge, and Singapore is taking firm actions to do our part to build a sustainable future. This year, the challenges will revolve around Singapore's national agenda on sustainable development.

2. Teams and Rules Hierarchy

2.1. Team Definition

Each team will have 6 members. Prior to the day of competition, team members not in groups of 6 will be reassigned to teams (6 pax) if possible.

This category is open to the following age groups:

- Primary: students 8-12 years old (in season 2023: born years 2011-2015)
- Secondary: students 13-16 years old (in season 2023: born years 2007-2010)

Students need not be from the same school. However, all the members of a team must be in the same category age group to qualify.

2.2. Expectations on Teams

Teams should behave fairly and be respectful towards other teams, coaches, judges and competition organizers. Teams are to adhere to the competition rules to ensure fair competition.

The construction and coding of the robot may be done only by the team. The task of the coach is to accompany them, help them with organizational and logistical matters and support the team in the case of questions or problems. The coach cannot be involved in the construction and programming of the robot or challenge.

On the competition day, during mission runs, coaches/mentors are not allowed to communicate with their teams.

If any of the rules mentioned in this document are broken or violated, the judges or chief referees can decide on one or more of the following consequences. Before a decision is reached, a team or individual team members may be interviewed to find out more about the possible violation of the rules. The interview can include questions about the robot or the program.

- A team may be disqualified completely from the competition immediately.

2.3. Rules Hierarchy

On the competition day, the following rule hierarchy applies:

- This booklet provides the basis for rules in this category
- Questions & Answers (Q&As) can override rules in the game and general rule document.
- **The Chief Referees have the final say in any decision.**

During a season, NRC may publish additional Question & Answers (Q&As) that can clarify, extend, or re-define rules in game and general rule documents. Teams should read these Q&As before the competition.

2.4. Additional Rules for NRC Coder Z Coding Challenge

Every team member is required to be online on their own computer or laptop and turn on the camera function on the Zoom platform throughout the competition unless stated otherwise.

If communication is necessary, the facilitator may allow team members to communicate with others under supervision.

Use of mobile phones or any other communication devices are prohibited during the competition.

If a team member is found to be disruptive or cheating during the competition, the team will be automatically disqualified from the competition.

Disruptive behaviours may include:

- Spamming of irrelevant information on the Zoom online chat
- Use of profanities, vulgarities, threatening, abusive, or insulting words or behaviours
- Purposefully unmuting and/or interrupting others

Cheating may include:

- Receiving unauthorised assistance
- Using unauthorised materials or aids
- Copying another's work

The organisers reserve the right to disqualify teams which, in their sole discretion, do not comply with competition rules.

3. Challenge Materials

All competition related materials will be presented to team members on the day of the competition.

An account to CoderZ Coding Challenge platform, CoderZ League in a Box, will be given to each team member a few days before the actual competition day. The login details for each team member will be emailed to the respective Teacher/Parent in charge (email is based on the details given in the registration form).

Team members do not need to submit any physical materials for the competition.

Additional pre-competition resources:

Team members can create a free CoderZ account to practise coding and familiarise themselves with the CoderZ platform in preparation for the competition.

1) Go to https://gocoderz.com/courses/amazon-cyber-robotics-challenge/
2) Scroll down and click on “Create Individual Student Account”

Account creation with class code (for teachers): https://tinyurl.com/CoderZResources. The solution videos can be found at the following link: https://bit.ly/CoderZACRCSolution.

4. Computer Requirements

Every team member is required to have a computer or laptop with a webcam or any device with webcam functions.

Minimum system requirements:
OS

- Windows 7
- OS X 10.9 Mavericks
- Chrome OS (Chromebooks)
- Ubuntu 16

Browser

- Latest Chrome browser (64 bit)

CPU

- i5 or similar
- Recommended 64 Bit architecture

RAM

- 4 GB minimum
- Recommended 8 GB for Windows/OS X

Screen Resolution

- 1280 pixels (width) or more

Internet Connectivity

- High Speed / broadband connection (15Mbps)
- Wired connections may help reduce load times

Whitelists

- The following two domains should be whitelisted in both email servers and firewalls for optimal performance of CoderZ:
    - CoderzWorld.com
    - GoCoderz.com
    - Zoom

5. Format & Procedures

5.1. Challenge Format

Teams will be invited to join a Recap of CoderZ on the morning of their respective day of competition. Teams will be given access to the competition pack (Figure 1) later in the day of the competition.

The competition pack comprises of three different parts, made up of missions and challenges that teams must complete to acquire points.

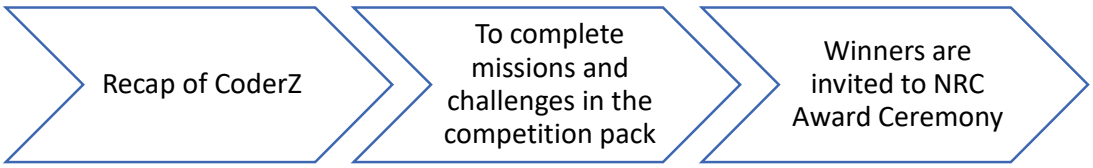
For the Primary Category, teams will be given the CoderZ League in a Box - Novice competition pack. This includes The Robogolf Challenge, The Disco Blocks Challenge and The Moon Base Challenge.

For the Secondary Category, teams will be given the CoderZ League in a Box - Junior competition pack. This includes The Farm Fever Challenge, The Lasers Vs. Balloons Challenge and The Jungle Gym Challenge.

Figure 1. Example of competition packs

Teams will have till 4:00 PM to attempt as many missions and challenges in their competition pack as possible to gain points for their team. It is not compulsory for every team member to attempt all the missions and challenges.

5.2. Challenge Procedures



5.3. Challenge Schedule

NRC CoderZ Coding Challenge will be held on 29 August 2023 (Primary) and 30 August 2023 (Secondary).

Time	Activity
9:00 AM – 9:30 AM	Briefing (Team members to attend via a zoom link. Teams to remain in the zoom call for throughout the competition)
9:30 AM – 10:30 AM	**Recap of CoderZ I** (in breakout rooms)
10:30 AM – 10:45 AM	Break
10:45 AM – 12:00 PM	**Recap of CoderZ II**
12:00 PM – 1:00 PM	Lunch Break
1:00 PM – 4:00 PM	**CoderZ Coding Challenge** (Team members to complete as many missions and challenges as possible to gain points)
4:00 PM – 4:15 PM	Debrief

5.3.1. Recap of CoderZ

Team members will be given time to practise (from 9:30am - 1pm) coding prior to CoderZ Coding Challenge, guided by facilitators. Team members will be able to ask facilitators for help if needed.

5.3.2. Mission & Challenges

Missions and Challenges are accessed via the CoderZ League in a Box competition pack given on the day of the competition. Teams must code their virtual robots (Figure 2) to accomplish a series of tasks. Teams have unlimited attempts at the missions and challenges.

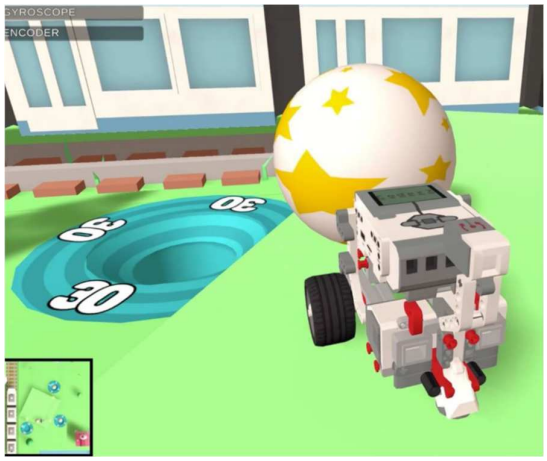


Figure 2. Example of virtual robot environment

Coding is done via a block-based interface for both the Primary Category and Secondary Category (Figure 3).

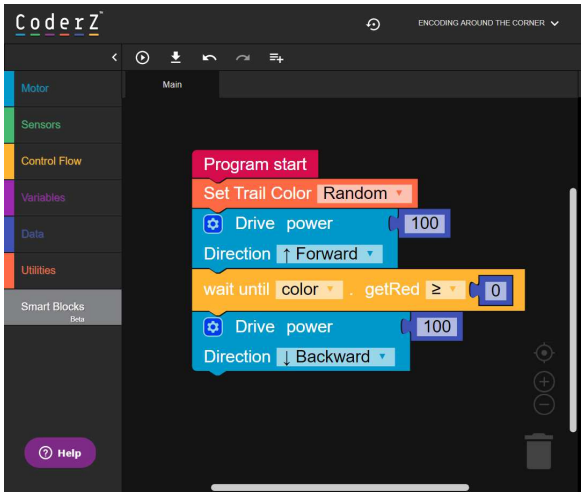


Figure 3. Example of block-based interface

The competition pack consists of both missions and challenges. In missions, team members individually engage in principles of coding and robotics. In challenges, team members collaborate using the knowledge they have gained.

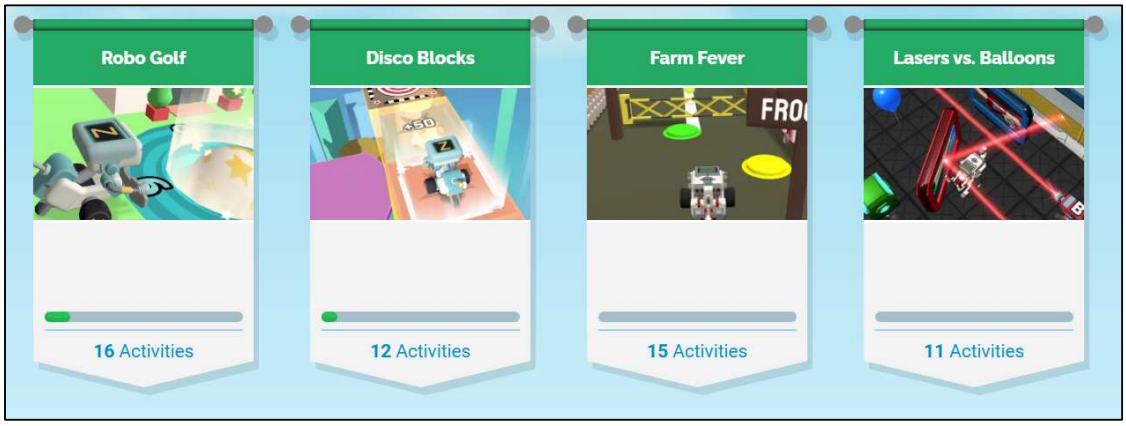


Figure 4. Example of missions and challenges

5.4. Judging Criteria

Scores are calculated by the CoderZ scoring system based on code quality, time taken for virtual robots to complete the missions and number of missions completed. Scores will be totalled as a team once the competition ends at 4:00PM.

Team scores can be viewed anytime during the competition (Figure 5). However, that is not the team's final score and ranking as bonuses have not been added. The top three scoring teams of each category will be recognised and **revealed two days after** the event ends.

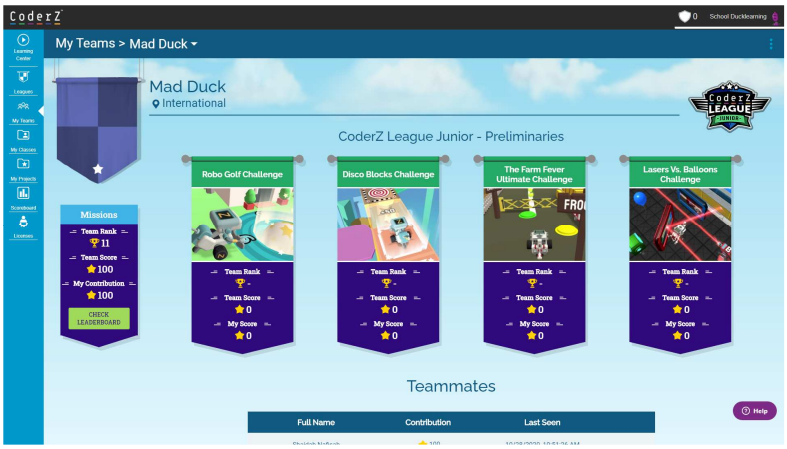


Figure 5. Example of scoring page

5.5. Scoring

The competition consists of two components, missions and challenges.

5.5.1. Missions

Each individual team member contributes points to their team by completing the missions. The maximum number of points that can be contributed per mission is 100 points. Completing a mission multiple times is permitted but students will not continue to collect points for each mission run. Instead, a team member's highest score for that mission is used when calculating the overall score for the team. If teams are looking to rack up points for a mission, then it is suggested that multiple students complete each mission on their own since all individual points end up counting towards the overall score.

5.5.2. Challenges

Challenges are summative activities that are like missions, but on a larger scale. All team members may participate in the challenges; however, unlike missions, only the highest-scoring team member contributes their score to the team. Challenges may be attempted multiple times. The highest score for a team is always the one that will count towards the final ranking. When the competition ends, the team scores for each challenge are ranked on a leaderboard. The following point totals are awarded to each team based on their final ranking:

Place	Points Awarded
1	2500
2	1500
3	1000
4	750
5	500
6 - 10	250
11 - 20	100
21+	0

Multiple teams cannot share a place on the leaderboard. In the event of a tie, the team who completed their challenge with the fastest overall time will take the lead.

Example

Team A has 3 students; Student A, Student B and Student C, all of whom completed the Robogolf challenge. Student A got 300 points for the challenge, students B got 400 points and student C got 500 points.

On the Robogolf challenge leaderboard, Team A has 500 points thanks to student C.

Team A is placed 3rd on the leaderboard with 500 points, right after Team B with 750 points and Team C with 900 points. Team A will receive 1,000 points for the Robogolf challenge, Team B will receive 1,500 points and Team C will receive 2,500 points.

5.5.3. Overall Score

The overall score is the sum of all points of a team comprised of the points from both missions and challenges. The overall score is the score that determines the winners of NRC CoderZ Coding Challenge.

The Overall Score tab is only revealed after the calculation of the bonus from the challenges, which will only be **revealed two days after** the event ends.

Examples of calculations for overall score:

	Total Mission Score	Robogolf challenge placement	Disco Blocks challenge placement	Moon Base challenge placement	Overall Score calculation	Overall Score
Team A	6,400	3rd	10th	7th	6,400 +1,000 +250 +250	7,900
Team B	5,900	2nd	24th	40th	5,900 +1,500 +0 +0	7,400
Team C	7,700	1st	5th	60th	7,700 +2,500 +500 +0	10,700

6. Awards & Prizes

Competition	Category	Rank/Team of 6	Prize
NRC CoderZ Coding Challenge	Primary School Category	1st	$300 Trophy Gold medals
		2nd	Silver medals
		3rd	Bronze medals
	Secondary School Category	1st	$300 Trophy Gold medals
		2nd	Silver medals
		3rd	Bronze medals

The top three winners for each category will be invited to NRC Award Ceremony held at Science Centre Singapore. The champion team for each category will be presented with a cash prize of $300 and a trophy. All winners will receive a medal. All participants will receive an e-certificate post competition.

In addition, the champion team for each category may be invited to take part in the Coder Z International League held online in Singapore.

The Organiser reserves the right to amend the prizes without prior notice.