



## 15th Annual Peel Elementary Robotics

Water

**Event Chair(s):** Jesse Teachman, Sharon Johnston,  
Chantel Wedemire-Roberts and Ingrid Carlaw  
**Contest Location:** Morning Star Middle School  
3131 Morning Star Drive, Mississauga  
**Contest Date:** April 10 and 11, 2018  
**Email:** [chantel.wedemireroberts@peelsb.com](mailto:chantel.wedemireroberts@peelsb.com),  
[ingrid.carlaw@peelsb.com](mailto:ingrid.carlaw@peelsb.com),  
[sharon.johnston@peelsb.com](mailto:sharon.johnston@peelsb.com),  
[Jessica.teachman@peelsb.com](mailto:Jessica.teachman@peelsb.com)



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## GENERAL RULES, REGULATIONS AND ELIGIBILITY

- Teams participating in the robotics challenge must use Lego Mindstorms Robotics and Software. Every effort should be made to ensure the robots are constructed using only official Lego material.
- Teams must consist of four (4) students, **(mixed boy-girl)** from schools in Peel. *On the day of the challenge, **teams who arrive with all boys or all girls will be allowed to participate however will not be entered into the formal competition.** It is your responsibility to ensure your team is mixed.*
- The precise tasks and conditions of the challenge will remain hidden until competition day. Photographs of the playing field will be posted in **late February**. Teams may use this to support their preparations for the event. *Please note that although we do not plan to change anything to our design, we still **reserve the right to reposition or make changes to the layout and the objects** on the competition track before competition date.*
- Time will be provided on challenge day for each team to set-up, test, and make adjustments to their robot and attachments based on the challenge playing surface.
- Teams will have to build an autonomous robot to carry out pre-designed missions in 2 minutes and 30 seconds. Teams will have the chance to compete twice.
- The Chairs reserve the right to change the amount of times as well as the time allotment on the day of the Challenge.
- Teams will not be permitted to use Bluetooth technology to control their robot during the trail competition.
- Only one EV3 or NXT may be attached or used with each robot. The robot must be fully autonomous (hands-off). Once the robot starts its task, it may not be touched during the course of the activity. Teams may start the robot again at the start position (Base) if time is still available and the task was not completed initially. Points will be deducted for bringing the robot back to Base or touching the Robot.

## AGENDA FOR THE DAY

- 10:00** Arrival, Registration, Challenges begin  
Lunch times are at the discretion of the Event Chairs
- 3:00** Challenge ends
- 4:00** Awards ceremony

## PURPOSE OF THE CHALLENGE

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The purpose of this challenge is to provide students an opportunity to compete in a friendly environment that fosters creativity, collaboration, and problem solving in an open-ended challenge. The theme for this year's Robotics Challenge is "**Water**". Together with their teammates, students will design, construct, and program an autonomous Lego robot to accomplish specific tasks on a competition table, as well as during a collaborative Robot Dance challenge.

## SKILLS AND KNOWLEDGE NEEDED

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Teams should come to the competition with their Mindstorms kits, and some attachments. Experience using a Mindstorms kit is a requirement for success. They should be ready to construct and program their robot to solve the challenge. While some building can, and should be done ahead of time, much work will need to be done at the competition site on competition day.

- Teams must bring an assembled, fully charged drive train. If available, teams may bring a spare assembled drive train, although only 1 can be used for the competition.
- Drive trains should be controllable, sturdy, and have room for additional parts and sensors to be added.
- Pre-created attachments may be built and brought to the competition based on your best inference as to the required challenges.
- It would be beneficial to ensure your robot is capable of remaining on a laid out path, capable of lifting or dragging objects, delivering material and moving objects around the board while avoiding obstacles.
- The Lego Robotics Challenge supports the Science & Technology curriculum across multiple grades. The challenges allow students to practice the skills involved in scientific inquiry and technological problem solving:
  - initiating and planning (e.g., asking questions, clarifying problems, planning procedures)
  - performing and recording (e.g., following procedures, accessing information, recording observations and findings)
  - analysing and interpreting (e.g., organizing data, reflecting on the effectiveness of actions performed, drawing conclusions)
  - communicating (e.g., using appropriate vocabulary, communicating findings in a variety of ways)

# EQUIPMENT AND MATERIALS

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## **PROVIDED BY PEEL (list and provide a picture, please)**

1. Table space for team to build/plan/etc.
2. Copy of judging rubrics
3. Playing Surface (for practice and performance trials)

## **PROVIDED BY PARTICIPATING SCHOOL**

1. Lego Mindstorm Robotics Kit (EV3 or NXT)
2. Laptop – with appropriate software (Lego Mindstorms). A back-up laptop would be recommended just in case one stops working.
3. Extension Cord and Power bar
4. Additional Lego pieces (such as Lego Mindstorm Education Resource Set)
5. Extra Batteries
6. Indoor Shoes
7. Reusable water bottle
8. Packed lunch

Supplies can be purchased at:

[www.spectrumed.com](http://www.spectrumed.com)

- Lego Mindstorms NXT **Education Base Set** #88527 \$350.00
- Lego Mindstorms NXT V.2.0 Software (Single User) #732094 \$91.95
- Lego Mindstorms NXT **Education Resource Set** #78228 \$91.95
- Lego Mindstorms EV3 education base set #730637 \$339.95
- Lego Mindstorms EV3 Software (Single User) #730639 \$99.95

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## **SAFETY CONSIDERATIONS**

Safety is a priority at the Peel Skills Challenge. At the discretion of the Judges and Event Chairs, any participant can be removed from the challenge site for not having the proper safety equipment and/or not acting in a safe manner.

Participants must show competence in the use of tools and/or equipment outlined in this scope and can be removed at the discretion of the judges and Event Chairs if he/she does not display tool and/or equipment competency.

**\*Participants will not be permitted to compete until they have the needed safety equipment. Event Chairs will have final authority on matters of safety.**  
-adapted from OTSC 2016

### **SAFETY CONSIDERATIONS SPECIFIC TO THIS CHALLENGE**

At the discretion of the judges and chairs, any competitor can be removed from the competition site for:

- Unsafe conduct
- Inappropriate actions
- Dishonest behaviour (i.e. accessing internet for solutions)

- Speaking with teachers and/or advisors about possible solutions. Teachers and advisors are **NOT** allowed to assist their team in any way. Failure to comply will result in disqualification of the student team.
- All food and drink must be consumed in the designated eating area. Observed violations of this rule will result in deduction of points from the safety category. Repeated violations may result in removal from the competition.

## CHALLENGE DESCRIPTION

### Part One: Robot Challenge

This year's theme for the Robotics Challenge is "**Water**". Water covers over 70 percent of the earth and helps sustain all living species. It is one of the most precious and limited resources and therefore must be preserved.

Some of the big ideas relating to water include:

- How water affects living species (flooding, E. coli, etc.).
- Water is a major part of the environment.
- Our actions affect the quality, availability and sustainability of water.

These ideas are the basis for the missions that teams will be attempting on the day of the challenge.

### Part Two: The Dance Challenge

After all mission runs have occurred the teams will be asked to program their robot with one dance move. This will be demonstrated on a dance floor. After meeting other teams, students will be asked to share the program and "teach it" to another robot. (share your programming with another team and add their programming to your robot in return) By the end of the day all robots should be doing the same sorts of dance moves perhaps in different orders. The dance challenge is assessed only for participation and collaboration and encourages teams to network and have fun. Nothing needs to be prepared in advance however teams are welcome to bring costumes or accessories for this fun activity.



## JUDGING CRITERIA

The Robotics Challenge will have a rubric scoring system based on points. Points are awarded as the robot successfully meets/completes certain performance criterion. Judges will oversee the events of the competition and the collaborative dance components of the competition. Overall team score will be the sum of the points awarded for each of the components: Programming and testing the robot, robot construction, teamwork and the successful completion of the task will be scored using a checklist.

Each attempt at the trials that make up the Robotics Challenge will have a point based scoring system. Points are awarded as the robot successfully meets/completes certain performance criteria. Performance criteria are structured so as to provide a range of tasks from easy to complex.

Teams are expected to:

1. Neatly assemble a successful solution to the challenge within the time constraints.
2. Demonstrate mathematical, scientific, and technological knowledge.
3. Demonstrate sound design, construction, and programming principles.
4. Demonstrate an efficient use of materials.
5. Demonstrate the best practices using materials, computer hardware and software.
6. Model a collaborative distribution of tasks.
7. Follow safe working practices.