

WATER

This is a very exciting new product developed in collaboration with the PEEL school district in Ontario, Canada (<http://www.peelschools.org>). This mat is designed to be used for many years in the Peel Skills challenge they do throughout the district (<http://www.peelskills.com>). The challenge is a 'day of' competition in which students do not see the robot tasks until the morning of the event. The purpose of the 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 Robotics Challenge Mat is "Water".

Visit: <http://bit.ly/PEELCHALLENGE> to learn more about PEEL Challenges.

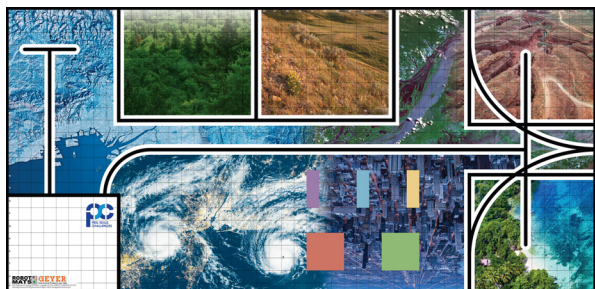
THE PROBLEM

Water covers over 70% 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 challenge mat. (Use Graphic Organizer on pg. 5 for guidance)

MATERIALS



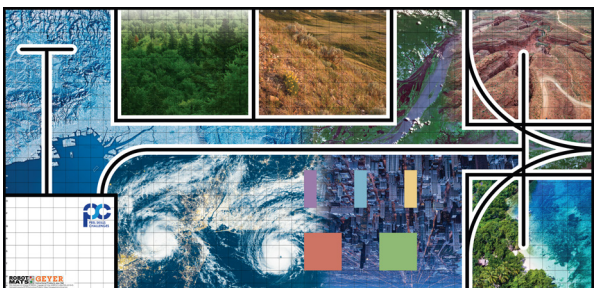
Option 1 (For FLL Practice) Materials Needed:

1 - Geyer #199000 Water, FLL Size Mat

1 - EV3 Robot

Lego® pieces to be used to build robot attachments

Lego® pieces to be used to build Water Sampling Devices, you will build 4



Option 2 (For Other Robotics Systems) Materials Needed:

1 - Geyer #199000 Water, FLL Size Mat

1 - Robot

Coordinating pieces to be used to build robot attachments

Pieces to be used to build Water Sampling Devices, you will build 4

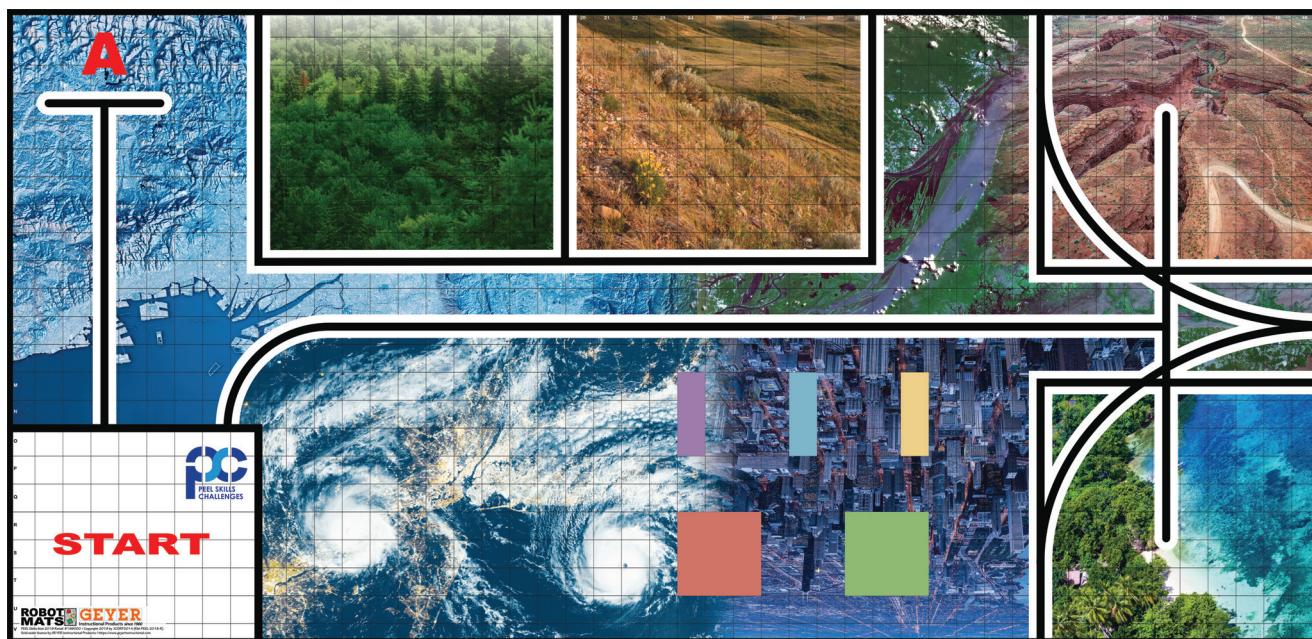
CHALLENGES

This is an aerial view of your robotics mat. Your goal is to design a robot and program it to effectively maneuver around the mat to solve various challenges. (There are markings on this picture that you will not find on your robot challenge mat.)

Challenge A

1. Place your robot on the “Start” position on the mat.
2. Write/code a program that allows your robot to take a “Water Sampling Device” to the Artic region on your mat. (This task is designated on the mat on the previous page with a letter “A.” The Water Sampling Device can simply be a block.)

Bonus: Add a touch sensor and write a program that returns the robot to “Start” following the same path. This program must be started by pressing the touch sensor.

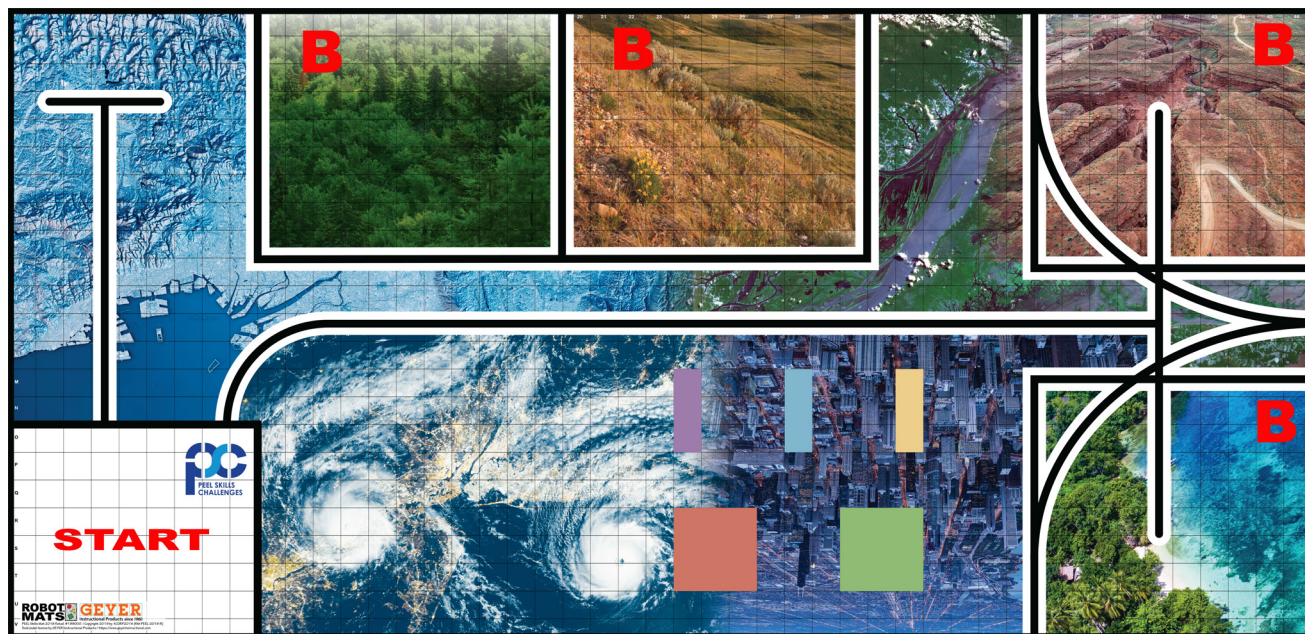


*Note, the word “start” and the letter “A” do not appear on your mat.

Challenge B

1. Place your robot on the “Start” position on the mat.
2. Design and build an attachment that allows you to move the “Water Sampling Devices” (you will need 4 of these) to each of the locations on the mat. You may need to write four different programs where each program returns to “Start” so that you can load the next item to be placed.

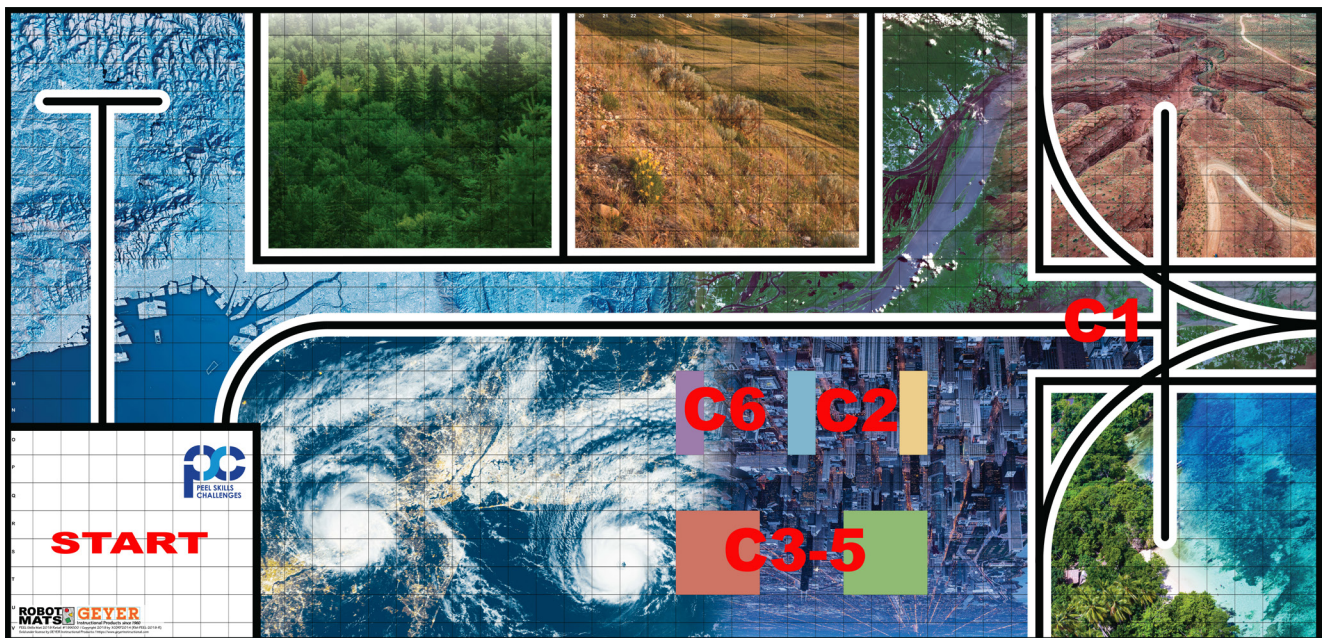
Bonus: Create an attachment and write a program that allows your robot to carry ALL of the “Water Sampling Devices” at once AND drops them in the correct positions around the mat.



*Note, the word “start” the “B” markings are not printed on the mat.

Challenge C

1. Place your robot on the “Start” position on the mat.
2. Design and build a robot that uses SENSORS to maneuver through the mat.
 1. Line following program to get your robot from start to the far side of the city.
 2. Color sensors to detect colored blocks.
 3. Color sensors to detect and verbalize color blocks. “Red” and “Green”
 4. Color sensors - detect “Red” change directions.
 5. Place blocks on the red / green squares. Use the Ultrasonic sensors to move forward within a certain distance from the blocks.
 6. Place items of your choice on the colored blocks. Assign those items to corresponding habitats on the mat and have students retrieve and relocate the items to the correct locations.



*Note, the word “start” the “C” markings are not printed on the mat.

THE PROBLEM GRAPHIC ORGANIZER

How much do you think water affects living species? What are some ways that different species are affected by the water around them?

| Species Type | How does water affect their daily lives? | When can water be detrimental? | How does this species affect the water around them? |
|-------------------------|------------------------------------------|--------------------------------|-----------------------------------------------------|
| Humans (in general) | | | |
| Humans in Urban Areas | | | |
| Humans in Rural Areas | | | |
| North American Wildlife | | | |
| African Safari Wildlife | | | |

What can you do as a young person to improve water quality in your area?

BRAINSTORM

In the spaces below develop/sketch two different robots to solve the problems presented on the mat. Label your materials and annotate any attachments and their function on your robot. Once both sketches are complete, indicate what you consider to be the strengths and weaknesses of each solution on the lines provided.

IDEA # 1

EVALUATE:

STRENGTHS

WEAKNESSES

IDEA #2

EVALUATE:

STRENGTHS

WEAKNESSES

DEVELOP A PROTOTYPE

Construct your robot. Remember to follow specifications and constraints. Neatly sketch your final solution below. Label dimensions and materials. Final sketch must be completed prior to testing.

TEST AND EVALUATE:

Did your robot successfully complete the robot challenge? _____

REDESIGN THE SOLUTION

What problems did you encounter? Did you change your original design concept? If so, why? If you had to redesign your model to solve the problem better, what changes would you recommend in your new design?