



Engineering And Robotics Learned Young

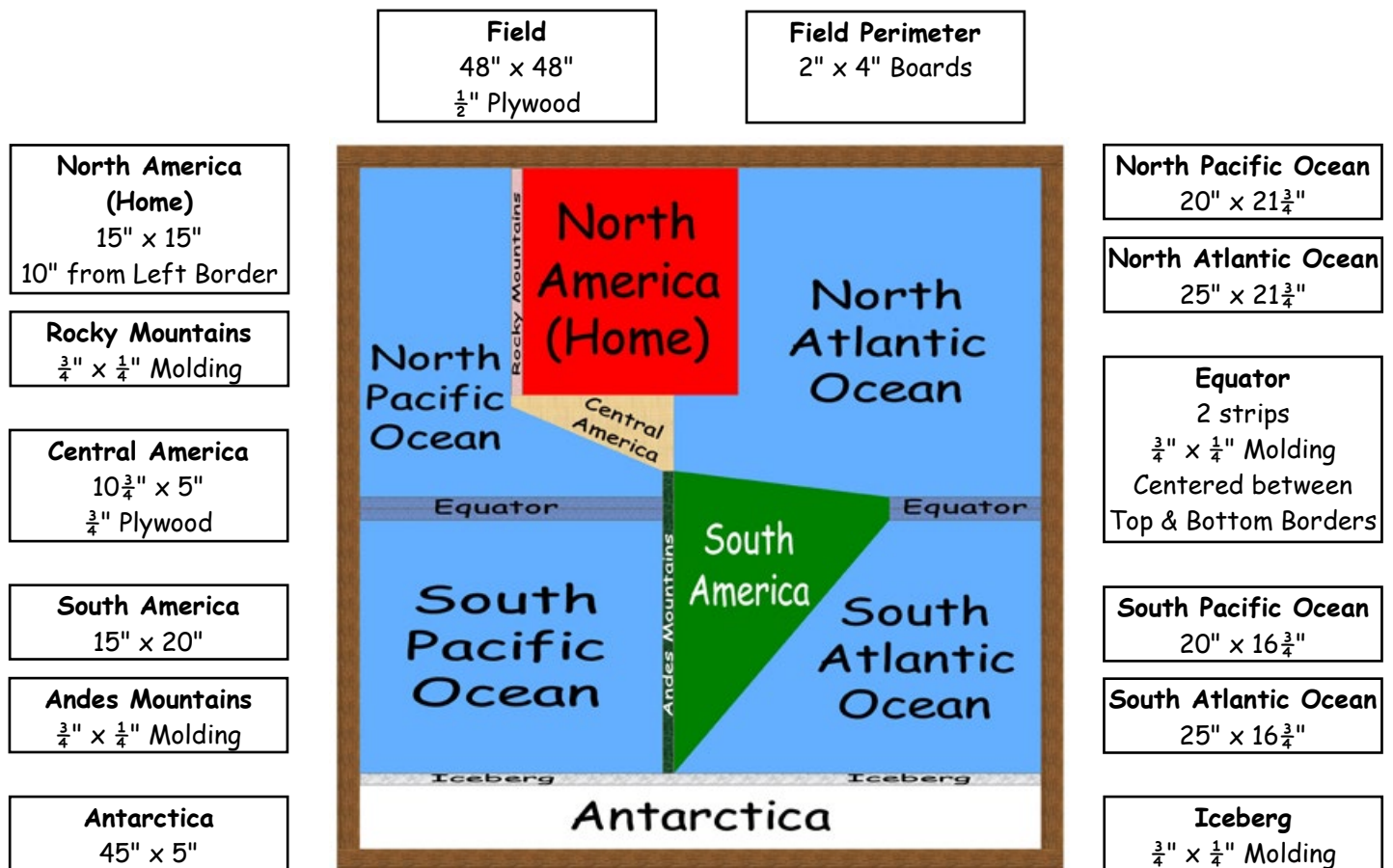
Engaging Students in Engineering before Stereotypes

Western Hemisphere Red Mission Rules

Roboticists, the Global Ocean Exploration Scientists, GOES, needs your help exploring the Atlantic Ocean! Using their SeaBots, GOES is continually making discoveries in the oceans that aids and improves our lives, and from GOES discoveries, we are keeping our oceans, seas, and gulfs much healthier. GOES needs you to build a robot to deploy the SeaBots in the North and South Atlantic Oceans. Please help GOES explore the Atlantic!

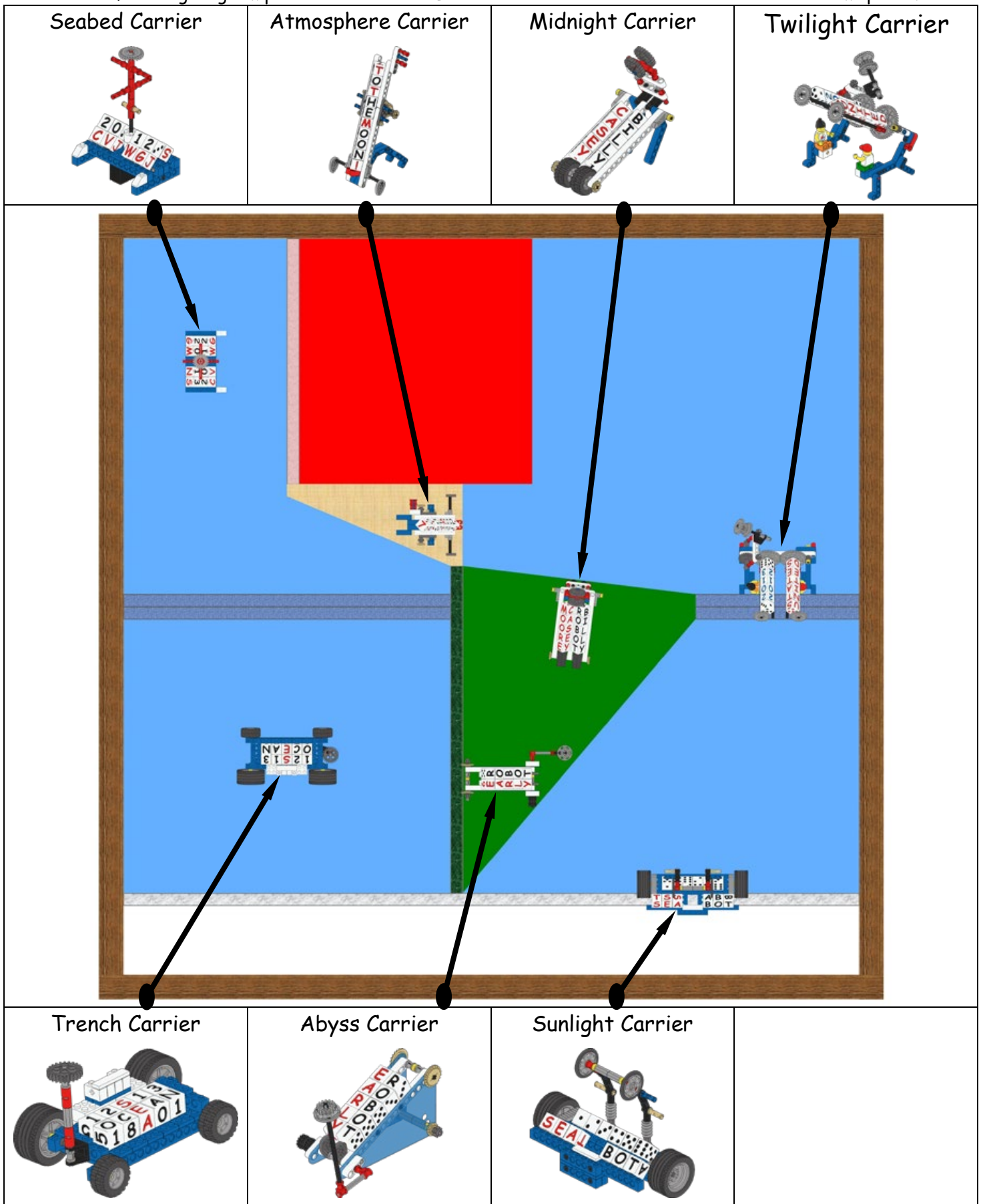
Below is everything that we know about the mission.

- The team must be ready to execute the mission for your EARLY Tournament.
- The equipment available for a team to build a robot is 3 LEGO® Simple & Motorized Mechanisms Kits.
- The following diagram presents the environment that will be encountered. Construction details are found in the *Mission Field Details* document.



Western Hemisphere

- The following diagram presents where the *SeaBots* and *Carriers* will be in the Western Hemisphere.



Mission Rules

1. The team has 2 minutes to complete the mission.
2. There are 76 **SeaBots** on the mission field at the beginning of each mission. The **SeaBots** are represented by dice. Dice details are found in the **Mission Object Details** document.
3. There are 7 **SeaBot Carriers** on the mission field at the beginning of the mission constructed from one LEGO® Simple & Motorized Mechanisms kit. Carrier details are in each **Carrier Instruction** document.
4. The team's score is determined at the end of the 2-minute mission.
5. If a **SeaBot** is moving when time expires, the **SeaBot's** scoring position is determined when the **SeaBot** has come to rest.
6. There are two scoring zones: the **NORTH ATLANTIC OCEAN** and the **SOUTH ATLANTIC OCEAN**.
7. The goal of the mission is to evenly *deploy* **SeaBots** amongst the **NORTH ATLANTIC OCEAN** and the **SOUTH ATLANTIC OCEAN** scoring zones.
8. A **SeaBot** is *deployed* when the **SeaBot** is directly supported by the field or other **SeaBots** that are *deployed*. A **SeaBot** is *NOT* *deployed* if the **SeaBot** is on a **Carrier** or in a robot.
9. The team scores 2 points for each **SeaBot** that is *deployed* in a scoring zone that has a corresponding **SeaBot** *deployed* in the other scoring zone. Therefore, each of these evenly *deployed* **SeaBot Pairs** is worth 4 points.
10. The team scores 1 point for each **SeaBot** that is *deployed* in a scoring zone and is not part of a **SeaBot Pair**.
11. There is one penalty zone: **ANTARCTICA**. The **ICEBERG** is part of **ANTARCTICA**.
12. The team is penalized 3 points for each **SeaBot** *deployed* in **ANTARCTICA**.
13. A perfect score is achieved by having 38 *deployed* **SeaBots** in each of the two scoring zones. Thereby, all 76 **SeaBots** are part of 38 **SeaBot Pairs** resulting in a score of 76×2 equaling 152 points if counting **SeaBots** or 38×4 equaling 152 points if counting **SeaBot Pairs**. In contrast, if all 76 **SeaBots** are *deployed* in one scoring zone, the resulting score is 76×1 equaling 76 points.
14. A **SeaBot** *deployed* and breaking the plane of a scoring zone is considered *deployed* in the scoring zone.
15. A **SeaBot** *deployed* in multiple zones simultaneously (scoring zone & non-scoring zone, scoring zone & penalty zone, penalty zone & non-scoring zone, etc.) is considered *deployed* in the zone that results in the greatest points.
16. A **SeaBot** *deployed* on the **ATLANTIC EQUATOR** is considered *deployed* in the scoring zone, the **NORTH ATLANTIC OCEAN** or the **SOUTH ATLANTIC OCEAN**, that results in the greatest points.
17. In summary, a **SeaBot** must be "*deployed in a scoring zone*" for a **SeaBot** to count for points. A **SeaBot** is *deployed* when the **SeaBot** is directly supported by the field or other **SeaBots** that are *deployed*.

18. Only the parts that are contained in three LEGO® Simple & Motorized Mechanisms kits along with nine 20" controller extension wires may be used to construct the robot and attachments (i.e. no other materials such as glue may be used on the robot). The kit parts may not be altered.
19. **HOME** is the 15" x 15" boundary extended vertically. The **ROCKY MOUNTAINS** are part of **HOME**.
20. The robot and all attachments must begin completely inside **HOME** at the beginning of the 2-minute mission (i.e. no LEGO parts may be off the playing field when the mission begins). The parts do not have to be assembled together and the parts may be removed from and returned to the field during the 2-minute mission.
21. The team may retrieve their robot without penalty when the robot is partially inside **HOME** by lifting the robot vertically. After retrieving, the robot must be returned to **HOME**. If a **SeaBot** or **Carrier** remains with the robot when the robot is retrieved without penalty, the **SeaBot** or **Carrier** that is now in **HOME** remains in play.
22. If a team touches their robot, including parts that have become separated from the robot, that is completely outside **HOME**, the team is penalized 10 points. The robot must be returned **HOME** to continue the mission and if a **SeaBot** or **Carrier** remains with the robot when the robot is returned **HOME**, the **SeaBot** or **Carrier** must be removed from the field.
23. The robot must start completely inside **HOME** every time the robot is returned **HOME** (i.e. after retrieving the robot, no part of the robot may be outside of **HOME** when continuing the mission).
24. The controllers and wires are NOT considered part of the robot.
25. The controller wires may only be used to provide electrical power to robot motors (i.e. the controller wires may not be used to drag or corral a robot, **SeaBot** or **Carrier**). If a controller wire is used improperly, the robot must be immediately returned **HOME** to continue the mission.
26. The robot shall not have any elastic stored energy when the mission begins or when the robot is returned **HOME**, but elastic stored energy may be created with a motor during the mission (i.e. the robot may not be "wound up" manually).
27. The team may touch a **SeaBot** or **Carrier** without penalty if the **SeaBot** or **Carrier** is COMPLETELY inside **HOME**.
28. If a team touches a **SeaBot** or **Carrier** that is not completely inside **HOME**, the team is penalized 10 points and the **SeaBot** or **Carrier** must be removed from the field. If a **Carrier** is touched, the **Carrier**, along with any **SeaBots** on the **Carrier**, must be removed from the field.
29. A **Carrier** is never considered part of the robot.
30. **SeaBots** may only leave **HOME** by using the robot or by "letting go" of either a **SeaBot** or something carrying a **SeaBot**. For example, a team member may not roll, push, or throw a **SeaBot** but a team member may put a **SeaBot** on a 'LEGO slide' and "let go" of the **SeaBot**.
31. Because **SeaBots** are very valuable, the team is penalized 10 points for each **SeaBot** ejected from the field. No penalty shall be assessed for a **SeaBot** that is removed by rule (e.g. for illegal touching, dragging, etc.).
32. A score of zero is awarded if penalties result in a negative score.

Please contact Mission.Control@EARLYrobotics.org with any questions or comments.

Thank you for maintaining the *Spirit Of The Game!*