

Engineering And Robotics Learned Young

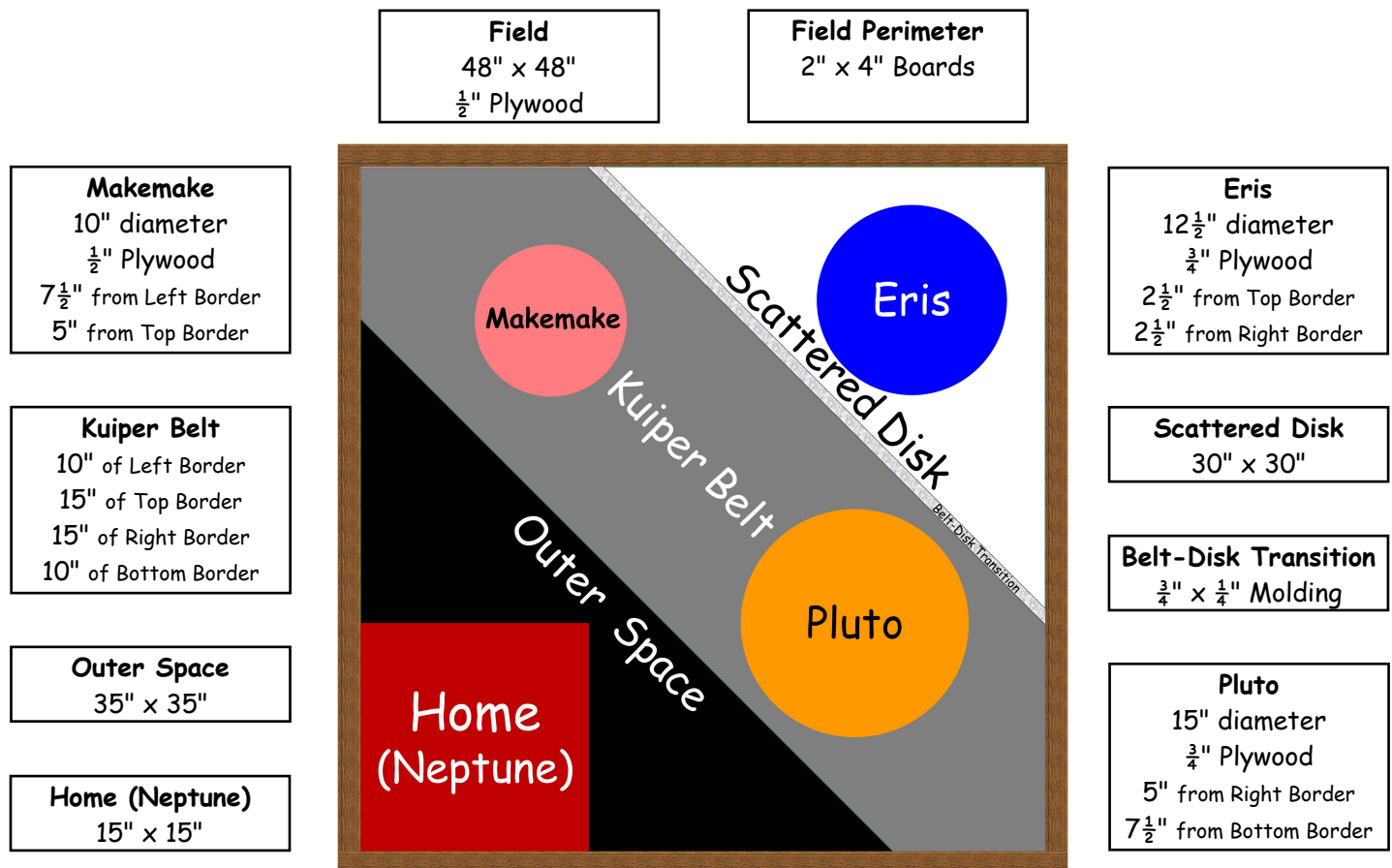
◆ EARLY ◆

Spring 2016 Robotics Competition

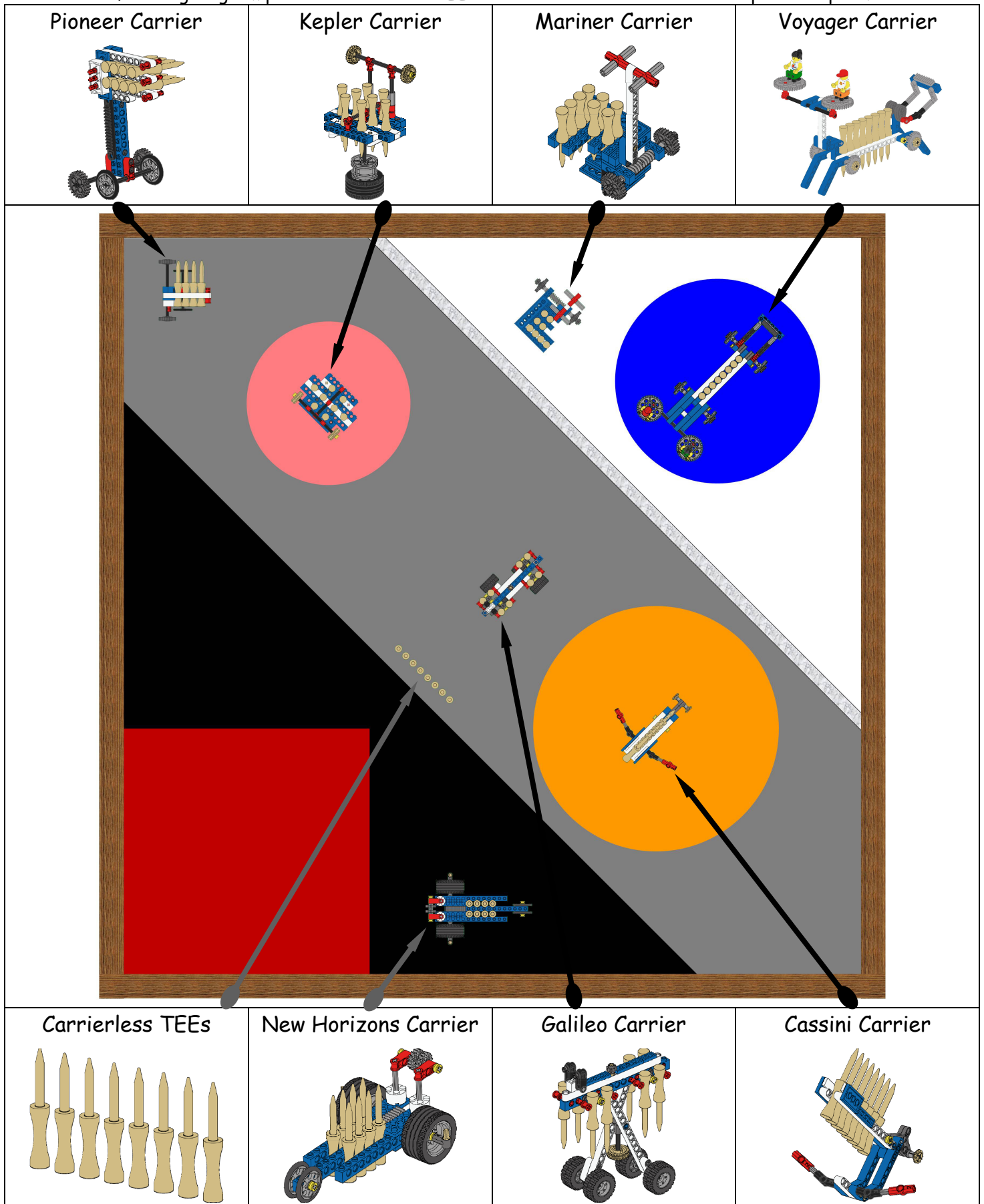
Roboticists, thank you for helping the Global Association of Space Agencies, GASA, explore Trans Neptunian Space, which helped us understand our outer Solar System! GASA now needs you to build a robot to continue Trans Neptunian Space exploration by deploying more Transneptunian Enhanced Explorers (TEE) into the Kuiper Belt, the Scattered Disk, and onto Pluto, Makemake, and Eris. Please help GASA continue exploring the Trans Neptunian Region!

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.



- The following diagram presents where the *TEEs* and *Carriers* will be in Trans Neptunian Space.



Mission Rules

1. The team has 2 minutes to complete the mission.
2. There are 64 **TEEs** on the mission field at the beginning of each mission, represented by wooden tees. Wooden tee details are found in the *Mission Object Details* document.
3. There are 7 **TEE Carriers**, each carrying 8 **TEEs**, 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. There are 8 Carrierless **TEEs** that are in the **KUIPER BELT** at the beginning of the mission.
5. The team's score is determined at the end of the 2-minute mission.
6. If a **TEE** is moving when time expires, the **TEE**'s scoring position is determined when the **TEE** has come to rest.
7. There are five scoring zones: **KUIPER BELT**, **SCATTERED DISK**, **MAKEMAKE**, **PLUTO**, and **ERIS**.
8. The goal of the mission is to *deploy TEEs* in the scoring zones.
9. A **TEE** is *deployed* when the **TEE** is directly supported by the mission field; expressly, a **TEE** must be touching the mission field to be *deployed*. Please recognize that a **TEE** resting on another **TEE**, a **Carrier**, or a robot and not touching the mission field is *NOT deployed*.
10. The team scores 1 point for each **TEE** that is *deployed* in the **KUIPER BELT**.
11. The team scores 2 points for each **TEE** that is *deployed* in the **SCATTERED DISK**.
12. The team scores 3 point for each **TEE** that is *deployed* on **MAKEMAKE**.
13. The team scores 4 points for each **TEE** that is *deployed* on **PLUTO**.
14. The team scores 5 points for each **TEE** that is *deployed* on **ERIS**.
15. There is one penalty zone: **OUTER SPACE**.
16. The team is penalized 1 point for each **TEE deployed** in a penalty zone.
17. A perfect score is achieved by having all of the 64 **TEEs deployed** on **ERIS**. Thereby, all 64 **TEEs** are worth 5 points each, resulting in a score of 64×5 , or 320 points.
18. A **TEE deployed** and breaking the plane of a scoring zone is considered *deployed* in the scoring zone.
19. A **TEE deployed** in multiple zones simultaneously (scoring zone & non-scoring zone, scoring zone & penalty zone, penalty zone & non-scoring zone, two scoring zones, etc.) is considered *deployed* in the zone that results in the greatest points.
20. In summary, a **TEE** must be "**deployed in a scoring zone**" for a **TEE** to count for points. A **TEE** is *deployed* in a scoring zone when the **TEE** is touching the field and is breaking the plane of a scoring zone.
21. 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.

22. **HOME (NEPTUNE)** is the 15" x 15" boundary extended vertically.
23. 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.
24. 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 **TEE** or **Carrier** remains with the robot when the robot is retrieved without penalty, the **TEE** or **Carrier** is removed from the field.
25. 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 **TEE** or **Carrier** remains with the robot when the robot is returned **HOME**, the **TEE** or **Carrier** is removed from the field.
26. 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 breaking the **HOME** plane when continuing the mission).
27. The controllers and wires are NOT considered part of the robot.
28. 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, **TEE**, or **Carrier**). If a controller wire is used illegally, the robot is immediately returned **HOME** to continue the mission and the **TEEs** and **Carriers** involved are removed from the field.
29. 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).
30. If a team touches a **TEE** or **Carrier** that is partially or completely inside **HOME**, the **TEE** or **Carrier** must be removed from the field. If a **Carrier** is touched, the **Carrier**, along with any **TEEs** on the **Carrier**, must be removed from the field. This rule allows **TEEs** and **Carriers** to pass through **HOME** but does not allow for team members to manipulate **TEEs** and **Carriers** either directly or with "LEGO Utensils" while in **HOME**. This rule also allows **TEEs** and **Carriers** to be cleared from **HOME** without penalty. This is the *EARLY Game Changing Rule* intended to make the Spring Mission more challenging than the Fall Mission.
31. If a team touches a **TEE** or **Carrier** that is completely outside **HOME**, the team is penalized 10 points and the **TEE** or **Carrier** is removed from the field. If a **Carrier** is touched, the **Carrier**, along with any **TEEs** on the **Carrier**, is removed from the field.
32. A **Carrier** is never considered part of the robot.
33. Because **TEEs** are very valuable, the team is penalized 10 points for each **TEE** ejected from the field. No penalty is assessed for a **TEE** that is removed by rule (e.g. for illegal touching, dragging, etc.).
34. 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!